MAIN OFFICE

Penton Building, Cleveland 13, Ohio

BRANCH OFFICES

New York 17 ....16 East 43rd St.
Chicago 11 ....520 North Michigan Ave.
Pittsburgh 19 ....2800 Koppers Building
Detroit 2 ....6560 Cass Ave.
Washington 4 ....956 National Press Bldg.
Cincinnati 2 ....2030 Carew Tower
Los Angeles 4 ...130 N. New Hampshire Ave.
London .....2 Caxton St., Westminster, S.W. 1

• • •

Published by THE PENTON PUBLISHING CO., Penton Bldg., Cleveland 13, Ohio, E. L. SHANER, President and Treasurer; G. O. HAYS, Vice President and General Manager; R. C. JAENKE, Vice President; F. G. STEINEBACH, Vice President and Secretary; E. L. WERNER, Assistant Treasurer.

Member, Audit Bureau of Circulations; Associated Business Papers, Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

STEEL

The Magazine of Metalworking and Metalproducing

OCTOBER 9, 1944

Volume 115—Number 15

NEWS

TECHNICAL

FEATURES

MARKETS

STEEL
October 9, 1944

Dividends for You!

Coming up a week from today is the 1944 National Metal Congress and War Conference Display in Cleveland. Scheduled also during the next 30 days are numerous meetings which round out the fall convention season. The imminence of these affairs, coupled with the fact they are held under wartime restrictions, suggests that every individual who expects to attend them should make a special effort to obtain the greatest possible return for his expenditure of time and money.

What can one do to get the most out of his attendance at shows and conventions?

No single answer can be given because no two persons go to a meeting or exhibition with exactly the same objectives. One man goes to obtain a fresh outlook on technical progress, another to examine the latest equipment, another to cultivate potential customers and still another to hobnob with contemporaries.

In spite of these diversified interests, it is possible to lay down general rules which should help the average visitor to derive maximum value from this attendance. The basic requisite is a plan.

Whether you are an executive, technician, educator, salesman or supervisor, you go to your convention for some specific purpose. You know you are primarily interested in discussions and equipment pertaining to heat treatment, welding, metallurgy or other subject. You know you wish to consult this or that expert on a problem which has been vexing you. You want to get information on a new machine which has interested you. There are committee meetings, breakfasts, luncheons and banquets which, for special reasons, you wish to attend.

Jot down these primary desires. Check them with the programs and work out your own schedule of "must" sessions, exhibits, interviews and other engagements. Keeping this schedule is your first objective.

Fortunate you are if this fixed program leaves you considerable time for "extra-curricular" activities. Cherish this "free" time, because it affords you leeway to chat with the unforeseen man who has been working on problems similar to yours, to investigate the "surprise" bit of equipment you encountered in the show, to engage in an unexpected heart-to-heart talk with a contemporary, to understand more fully than ever before the inside problems of an important customer, to make new friends and to absorb new ideas.

Plan your "musts," but save time for the unpredictable "extras." In this way you can make your convention and show attendance pay handsome dividends.

METALS IN PEACETIME: Every producer, fabricator and manufacturer is vitally interested in the influences of the war period which will be carried over into the postwar era. To what extent will practices and habits arising from wartime necessity prevail when industry resumes its peacetime status?

In order to obtain industry's answer to this question, the editors of this publication questionnaired thousands of representative companies in the metalworking field. Replies have been received from the officials of 1922 plants. These responses afford an illuminating digest of what American industry thinks about the use of metals in peacetime products.

Indicative of the scope of the survey is the summation of the probable use of five metals in the postwar period. Of those who replied to the questionnaire, 42.5 expect to use more steel after the war, 41.0 per cent expect to use more copper and brass,

(OVER)

58.3 per cent more aluminum, 61 per cent more plastics and 35 per cent more magnesium.

While these general figures may be indicative of trends, the really useful information derived from the survey is to be found in the breakdown of answers classified as to size of plant, use of principal materials and character of products manufactured. The data showing the expected peacetime reliance upon various basic and emergency materials should appeal to all elements of industry which will participate in the lively postwar rivalry for market acceptance. —p. 159

* * *

PLANS FOR V-E DAY: Although the slowing of Allied advances in Europe has relieved the pressure for more specific details on the government's plans for reconversion, WPB is making progress in its efforts to facilitate industry's partial shift to civilian production.

Last week the agency announced definite plans for V-E Day. It will replace the present preference ratings by a single military priority; continue the AAA rating; authorize steel, copper and aluminum mills and warehouses to take orders without CMP tickets; and discontinue a lot of red tape and revoke numerous conservation and limitation orders.

About 500 L, M, P, E, U and R orders are effective today. It is hoped about 350 of these can be dropped, leaving 150 after V-E Day. If this proposal can be carried out and if other orders can be revoked later, the end of the Japanese war may find industry well along in its transition. —p. 93

* * *

ELECTROPLATED LEAD: While lead has not been used as extensively as zinc, tin and nickel as a protective coating for iron, steel and nonferrous metals, there are grounds for believing that lead plating will find increasing applications.

One reason is that the experience of manufacturers in meeting specifications for lead coatings on military articles has resulted in a great improvement in technique. Having worked out certain problems successfully, manufacturers will have an incentive to extend the plating process to civilian uses.

Secondly, improvements in the use of addition agents in other plating baths now will be available for lead plating. Third, electroplating recently has turned "scientific," with the result that progress in plating processes is being accelerated sharply.

Finally, lead plating will be attractive as a substitute for some more expensive and less available plating materials. —p. 128

HONORABLE DISCHARGE: Acting upon the recommendation of Howard Coonley, director of the Conservation Division of WPB, J. A. Krug, chairman of the board, has announced that the affairs of Mr. Coonley's division will be wound up as of Oct. 31, 1944, and the activity discontinued. Mr. Krug states that the death verdict is in conformity with WPB's policy "to terminate promptly any operations deemed unnecessary."

This action will be applauded by most industrialists. Those who are familiar with the work of the Conservation Branch of WPB know that it has performed a creditable job. As a result of its activities, many critical materials were conserved when the emergency situation was acute.

However, the need for special attention to this phase of the war effort has passed. WPB deserves credit for recognizing this fact and for terminating the work of the division.

Would that the heads of other agencies could see the light and would discontinue the scores of other divisions which have no longer any valid excuse for existence! —p. 107

* * *

ANOTHER BOTTLENECK? Slowly the ponderous machinery set up to deal with wage problems moves to settle the dispute over the Little Steel formula. Solemnly the War Labor Board listens to the testimony of both sides. According to current opinion, the board will consider the pros and cons and on or before Oct. 15 will submit a report incorporating its recommendations.

Many persons doubt whether much of the testimony submitted will influence the final decision. Cynics feel that the outcome will rest upon factors not immediately pertinent to the actual question of what is a fair wage.

Similar doubts arise in connection with the decisions of certain government agencies. Many corporation officials are wondering whether the extended efforts they have made to prove their point on taxes, renegotiation, requests for wage and salary advances, pension trusts, prices, etc. are given competent attention. Sometimes it looks as if the decisions in these dealings with industry are the result of personal whim or fancy.

Perhaps there is a bottleneck in justice. —p. 96

E. L. Shaner

EDITOR-IN-CHIEF

Ryerson Explains New Alloy Plan at Metal Show

All steps for providing hardenability data will be demonstrated

NATIONAL METAL CONGRESS • CLEVELAND • OCTOBER 16-20 • BOOTH 141-B

In Booth 141-B at the National Metal Congress, Ryerson plans to conduct Jominy End-Quench Hardenability Tests and to explain how hardenability results can be interpreted in terms of physical properties for quenched and drawn alloy bars of various sizes. If you attend the show, don't miss this unique Ryerson display.

Ryerson has always exercised close control over alloy steel quality, and for a number of years has furnished the chemical analysis and heat treatment response data with each alloy shipment. Now, this service has been extended under the Certified Steel Plan to give new added hardenability information, which makes Ryerson service even more helpful than before.

A new type of report, containing both hardenability and analysis data, now is being sent with each Ryerson alloy steel shipment. In addition to the chemical analysis, every heat of alloy destined for Ryerson stocks is subjected to a series of end-quench tests. The results of these tests are interpreted through tables of known physical relationships to reveal obtainable tensile strength, yield point, elongation, and reduction of area for bars up to 4 inches in diameter, that have been quenched and drawn at 1000°, 1100° and 1200° F. The Ryerson Alloy Steel Report includes all this test data plus a recommendation of working temperatures.

Whether you order a single bar or many tons, you are assured of a report covering all alloys shipped. All Ryerson alloys are identified with color markings according to type of steel. Large bars are individually stamped, smaller bars are bundled and tagged with an unmistakable heat symbol. The identification is cross referenced between steel and report sheet so that any steel can be quickly verified.

Investigate! Make sure you are getting this important help.

JOSEPH T. RYERSON & SON, INC.

Steel-Service Plants: **CHICAGO • MILWAUKEE • DETROIT • ST. LOUIS • CINCINNATI CLEVELAND • PITTSBURGH • PHILADELPHIA • BUFFALO • NEW YORK • BOSTON**

V-E Day Pattern for Industry Is Unfolding Gradually

Task Committee of War Production Board completes preliminary draft of plan to be put into effect when victory in Europe is achieved. 1944 war production is expected to come within 2 or 3 per cent of schedule

INDUSTRY reconversion plans continue to make the headlines despite the slowing down of the Allied offensive in Europe and the dissipation of hopes that the German war would be over by the time the snow flies.

One month ago it was hard to repress the enthusiasm of the experts who were freely predicting victory in Europe by October. General Patton's boys were running helter-skelter over France, playing hob with what remained of the German army in the West. Everybody, at least almost everybody, was certain we would be well along on reconversion before the end of the year.

Today, however, sentiment is less optimistic. The Germans have been able to make a stand at the Siegfried line and the experts have made a complete about-face, now predicting continuance of the German war into 1945. A month ago they were blowing hot; today, they're blowing cold.

That this old American custom of blowing hot one day and cold the next would adversely affect reconversion is taken for granted. The fact remains, however, that despite the disappointment in Europe and the postponing of victory until some indefinite time, the heat has not been taken off the reconversion theme. As a matter of fact indications are that, if anything, pressure for definite, detailed planning has increased to the point government agencies charged with working out a program are beginning to give more than lip service to the subject. At any rate, developments the past week would seem to bear out this view.

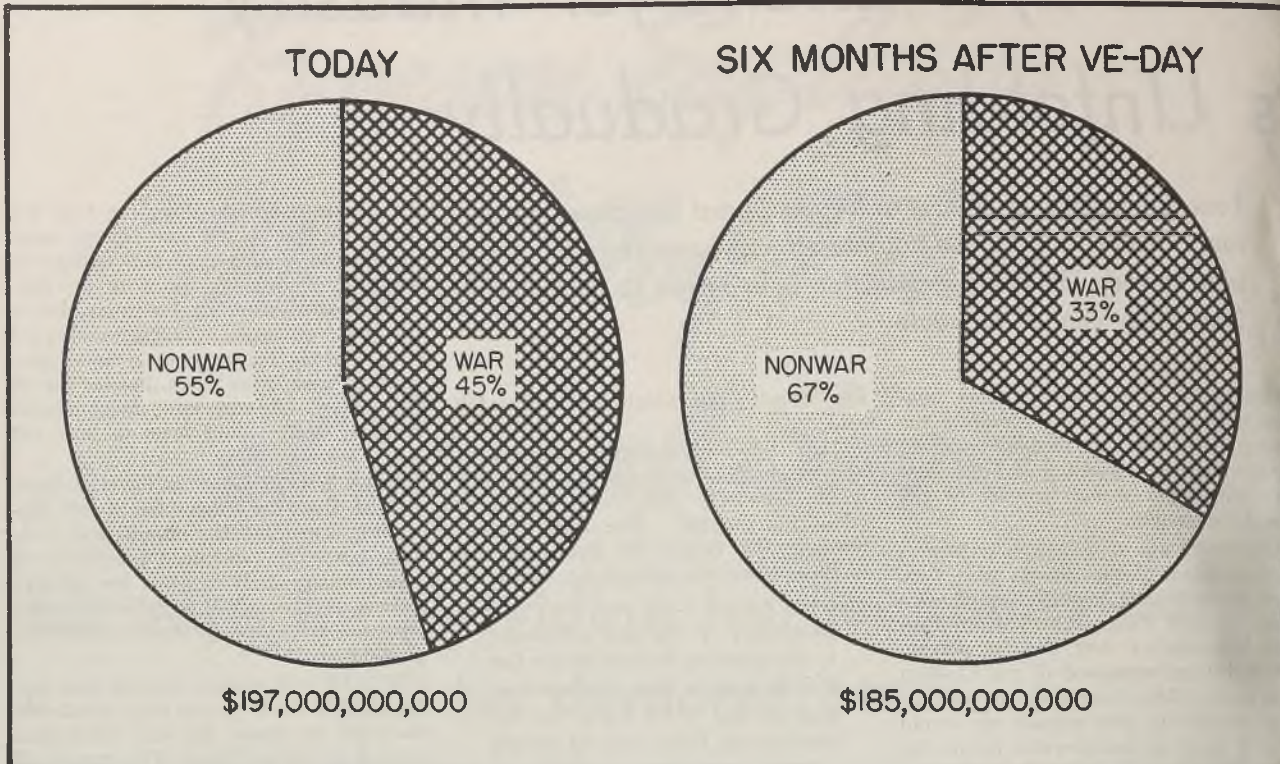
In his first official act as the new chairman of the War Production Board succeeding Donald M. Nelson, resigned, J. A. Krug last week announced completion of a preliminary draft of plans for industry reconversion come V-E day. This program, prepared by a special Task Committee, provides that:

1. WPB will remove controls over materials on V-E day except those absolutely necessary to assure the war production needed to defeat Japan. This means all manufacturers can use for any civilian production any plant and any materials not needed for war production.

2. WPB, in co-operation with other government agencies, will assist and encourage industry in resuming civilian production and maintaining employment

Reminders of the fast conversion to war done by Packard Motor Car Co. by moving into production of marine and Rolls-Royce aircraft engines are these rows of ghostly weather-proof covers which conceal 2000 machines once used in building automobiles, and now in open yards around the Packard plant. Reinstallation when war contracts are canceled will be a difficult job

U. S. Production Today and After V-E Day Compared



through its industry divisions and industry and labor advisory committees.

3. The board will maintain its organization and powers so as not to relinquish authority until it is certain war production is adequate for victory over Japan.

To carry out this program the Task Committee made the following proposals:

1. Replacement of the present preference rating structure by a single fully extendable, MM rating band, reserved almost exclusively for direct military requirements, including military lend lease.

2. Continuation of the AAA preference rating.

3. Authorization at V-E Day for steel, copper, and aluminum plants and warehouses to accept orders and make deliveries of these materials without CMP tickets, and complete elimination of CMP as soon as practicable thereafter. However, orders placed prior to V-E Day for CMP materials should retain preferred status for a limited period.

4. A transition to the new priorities policy which will combine a minimum of paper work and reshuffling of production schedules with necessary protection of military procurement and the earliest possible achievement of free action in the civilian economy.

5 Revocation at V-E Day of the great bulk of conservation, limitation, and other WPB orders and regulations; retention of orders in simplified form only where clearly necessary to protect military procurement or minimum civilian requirements basically essential to the effective functioning of the economy and progressive revocation of remaining orders and regulations as quickly as possible.

In all, some 500 L, M, P, E, U, and R orders are on WPB books today. Of these about 200 apply to chemicals, textiles (including leather and cordage), and forest products (including containers) —in which widespread shortages are expected to continue. Only half of the orders in this group of tight materials can be revoked immediately; about 100 will have to be retained.

Of the other 300 orders, covering other areas of the economy (particularly metals and metal products), it is proposed to revoke 250, leaving only 50. Thus, all told, the proposal calls for revoking 350 out of 500 orders. And the 150 that are to be retained will be greatly simplified. In effect, orders controlling hard goods—metal products—are to be virtually eliminated.

Must Maintain Effective Organization

6. The committee recognizes that military cutbacks will necessarily be uneven in their impacts, producing extremely heavy reductions in demand for some materials and products and virtually no change in others. So long as this is the case, WPB must retain some allocation and scheduling controls and must maintain its contingent authority to minimize the consequences of acute shortages when they develop. To do this, WPB must maintain an effective organization, including a competent field staff, a compact group of industry divisions staffed by men with industrial "know-how," and continuing contact with business and labor advisory committees.

7. Maintenance of sufficient reportin of information to afford at all times clear understanding of the industria picture and to permit immediate an intelligent remedial action where in dicated.

There should, however, be no "spoo feeding" of the economy, according to th report. No attempt should be made t curtail individual initiative in the searc for and purchase of materials and com ponents that will remain in short suppl for only a brief period. No actio should be taken that might hampe private enterprise or ingenuity, either b restricting members of an industry to his torical pattern of business or by prevent ing entry of newcomers. Except for mili tary requirements, which must be pro tected at any cost until victory over Japa is secured, it is expected that essentia needs will by and large be met withou government control, either restrictive o supporting.

The Task Committee was instructed t eliminate rules, regulations, and order whenever and wherever feasible—on th theory that the fewer the restrictions th quicker would be reconversion and re employment. However, in cases in whic materials and components were certai to be in short supply, maintenance of conservation and allocation orders were prescribed.

That the reconversion task which will face industry on V-E Day is enormous is becoming increasingly apparent. On the basis of present plans some 35 to 40 per cent of war contracts will be cut back immediately after termination of the

German war. These cutbacks will hit some areas harder than others, projected cuts ranging from 12 to 49 per cent in various WPB regions.

Roughly it is estimated that about 4,000,000 workers will be released from munitions production after victory in Europe. If this slack in employment is to be taken up quickly, the freeing of production facilities and materials from wartime controls as soon as possible will be necessary.

Indications are few materials will be in short supply after Germany falls. Despite the unemployment resulting from war order cutbacks, however, overall labor supply will be short and will continue tight at various points. In this connection government officials point out that even with the 40 per cent cut in war contracts total war business on industry's books will top the $65 billion mark, which should be more than sufficient to maintain employment on a high level through the initial period of industry transition.

Government reconversion plans so far announced have been received with mixed feelings. In some quarters the view is held that there is little prospect the releasing of materials and manpower will materially help certain lines get quickly back into civilian production. For example, certain automotive industry leaders are of the opinion that unless steps are taken permitting them to clear their plants of governmment-owned machinery and allowing them to make pre-reconversion plans for resuming normal production many valuable months will be lost after V-E Day in reconverting the automotive plants. Much of this preparatory work, it is maintained, can be done now without interfering with war production in any respects.

Even before V-E Day, however, some reconversion will be effected. In fact, reconversion on a very limited scale already is being permitted as indicated by a report issued last week by WPB. According to this statement, reports reaching WPB indicated that manufacture of $26,055,000 worth of civilian goods between now and Sept. 30, 1945, has been authorized under the "spot" procedure contained in Priorities Regulation No. 25. Reports from field offices indicate a total of 1506 applications had been approved. Eighteen applications had been denied because of adverse War Manpower Commission decisions, while 245 had been denied or rejected for other reasons. The remainder of the applications are being processed.

The report indicates that manufacture of the following items has been authorized: Automotive replacement parts and maintenance equipment, electrical conduit equipment, fabricated wire products, metal building products (other than sheet metal), copper and bronze powders, metal office furniture, domestic electric vacuum cleaners, miscellaneous kitchen and household utensils, household aluminum ware, portable incandescent lamps, innerspring mattresses, dual sleeping equipment, cutlery, plated silverware, pens and pencils, harvesting machinery, dairy and poultry equipment, tobacco manufacturing equipment, domestic cooking and heating stoves (not electric), plumbing sanitary ware, domestic oil burners, domestic hot water heaters, domestic and industrial gas heaters, tire patches, blue printing and photostating equipment and lithographing equipment.

Field offices have authorized the use of 321 tons of carbon steel, 4200 pounds of brass mill products, 750 pounds of copper and copper base alloy foundry products, 1,513,479 pounds of aluminum for the manufacture of these products.

Meanwhile, pressure for war goods continues with unabated force. Last week WPB Chief Krug warned industry the nation had entered its most critical period of war production, a period which would continue until the end of the year unless Germany collapsed before that time.

In statistical report discussing war production trends since 1942, he pointed out that the task before the nation's war plants is vast at this crucial moment, at the same time expressing confidence in industry's ability to come within 2 or 3 per cent of war production schedules by the end

(*Please turn to Page* 345)

Present, Past and Pending

■ HAMILTON PROPELLER PRODUCTION LINES BEING MOVED

PAWTUCKET, R. I.—Darlington branch plant, this city, Hamilton Standard Propellers division, United Aircraft Corp., will be closed by the end of 1944. Production lines are being moved to the plants at East Hartford, Conn., and Norwich, Conn.

■ GE REDUCING ROCKET LAUNCHER OUTPUT AT LOWELL

LOWELL, MASS.—Production is being reduced at the local plant of General Electric Co., involving gradual release of employes. Rocket launchers are produced here.

■ EASTERN MALLEABLE BUYS FRAZER & JONES CO.

NAUGATUCK, CONN.—Eastern Malleable Iron Co. has acquired the Frazer & Jones Co., Syracuse, N. Y., and plans postwar expansion of the latter's foundry, now employing 300 workers on war contracts.

■ FLOOR SET UNDER GOVERNMENT-OWNED ALUMINUM SCRAP

WASHINGTON—Surplus Administrator Clayton has established a floor under government-owned aluminum scrap, precluding distress sales at government loss. Established minimums do not apply to lots of 10,000 pounds or less, to borings, turnings, or aluminum scrap in terminated contracts involving claims under $10,000.

■ NASH MOTORS PREPARES FOR EXPERIMENTAL CAR MODELS

DETROIT—Nash Motors division, Nash-Kelvinator Corp., has been authorized by the War Production Board to engage in limited preparatory work in producing experimental models of civilian passenger cars. Authorization involves initial expenditures of $90,000 between September, 1944, and February, 1945.

■ CALIFORNIA STEEL FIRM ENLARGES STRIP FACILITIES

LOS ANGELES—California Cold Rolled Steel Corp. has enlarged its production facilities by addition of three new strip mills, increasing capacity by 500 per cent and enabling the company to produce strip ⅜-inch to 16 inches in width.

■ MASSILLON PLANT, REPUBLIC STEEL, MAY CUT WORK-WEEK

CANTON, O.—Workers at the Massillon and Canton plants of Republic Steel Corp. have appealed to the War Manpower Commission, Washington, to permit them to go to a 40-hour work-week to avoid layoffs. This permission was granted at the Massillon plant.

■ PLATE SHIPMENTS DECLINE 6749 TONS IN SEPTEMBER

WASHINGTON—Plate shipments totaled 1,060,000 tons in September compared with 1,066,749 tons for August and 1,106,851 in September, 1943.

■ CEILINGS RAISED ON SOME CASTINGS

WASHINGTON—Increases in ceiling prices of two groups of steel castings were announced last week by OPA. Power shovel and locomotive crane castings, except shoes and treads were increased 6 per cent while the maximum prices of railway car and tank car castings were raised 17 per cent.

■ AUTHORIZED TO PRODUCE ALUMINUM WARE

WASHINGTON—WPB has granted authorization to several manufacturers to produce aluminum ware in the fourth quarter of 1944. Those authorized were: Hayward Nonferrous Foundry, Hayward, Calif.; San Francisco Die Casting Co., San Francisco; Tray Service Co., Dallas, Tex.; Farber & Shlevin, Brooklyn; Leyse Aluminum Co., Kewaunee, Wis.; West Bend Aluminum Co., West Bend, Wis.

Avoid Inflation, Industry Urges

War Labor Board hears final pleas of management and unions. Recommendation on Little Steel formula may be sent to President within week

No commitments were made to these labor leaders on abolition or modification of the Little Steel wage formula at a recent White House conference. After an hour-long conversation in which the labor spokesmen outlined their case, the President is said to have indicated that inasmuch as the wage case still is before the NWLB, he could not take any action before it makes a recommendation, promised for Oct. 15. Shown leaving the White House are, left to right: Philip Murray, CIO president; Julius Emspak, UERW-CIO; Mrs. Anna Rosenberg, labor advisor to the President; R. J. Thomas, UAW-CIO; William Green, AFL president; George Meany, AFL secretary-treasurer; and Daniel Tobin, of the AFL teamsters' union. NEA photo

THE BATTLE over the Little Steel wage formula, heretofore largely a duel between the steel producers and the United Steelworkers of America-CIO, was enlivened in its closing stages by the entrance of allies on both sides.

By invitation of the War Labor Board, which heard the case, representatives of other industries and of other unions presented their views. The unions unanimously asked the formula be abolished or modified. Industry asked that present stabilization policies be maintained to avoid the peril of inflation.

Testimony introduced before the board by the steel producers and the steelworkers' union was anticlimatic, being practically a repetition of that presented to the board's panel last summer. Practically the only new touch introduced by either side was the attempt by Philip Murray, president of the steelworkers' union and of the CIO, to read into the record a purported "survey" by the Office of Price Administration indicating the steel producers could increase wages without advancing prices. This was ruled out by the board.

The board begins consideration of the testimony this week and plans to complete its report by Oct. 15. Presumably it will be presented to the President and Fred M. Vinson, director of economic stabilization.

Cynical observers believe that the case is largely a formality, that the future wage policy already has been determined, and that the President will announce it at a politically opportune time.

The situation was fairly summarized during the board's hearings last week by Robert J. Watt, AFL international representative, and a member of the board. He said the issue of cracking the formula could hardly be made a "political football" because "those who presumably will vote for Mr. Roosevelt are trying to upset the wage policy, while those who generally are for Mr. Dewey want to hold the line."

General Motors Corp. told the board there should be no change in the wage policy at this time to avoid the peril of inflation. In a statement by H. W. Anderson, GM vice president, the corporation declared there could be no effective stabilization of the cost of living unless wage stabilization remained, warning that the danger of an uncontrollable spiral of rising living costs will continue until the wartime backlog of consumer demand has been largely met.

"If we believed that a general wage increase and the resulting general price increase, including an increase in the cost of living, would be a good thing for the country, for our employes and our business, we would not oppose recommendations to change the present wage stabilization policies to permit a general wage increase throughout all industry. But we do not," Mr. Anderson said.

Urges Support of Stabilization

"Until the period of critical shortages is over and the danger of inflation is past, we believe that the sound policy for all Americans is to continue to support the existing stabilization act insofar as it is designed to keep the present level of industrial costs and the cost of living from rising further due to inflationary pressures.

"None of us want a short postwar boom followed by a crash and a depression as developed after the last war in 1919, 1920 and 1921.

"The most critical problem the country faces during reconversion and postwar is the question of jobs. This board should reject any changes in our wage stabilization policy which may interfere with industrial efforts that will provide postwar jobs.

"Jobs will not be created, nor will deflation be avoided by raising wage rates. Quite the contrary. Taxes must be reduced. Extravagance and unnecessary government expenditure stopped. Efficiency must be increased and activity stimulated—so that more goods can be distributed and everybody have more."

Eric Johnston, United States Chamber of Commerce president, urged a continuation of present wage and price stabilization until after the war. He opposed lifting the ceiling on wages now because it probably would bring inflation first and later deflation, as was the case in the last war.

He was conscious, he said, of the workers' worries over the prospects of shrinking pay envelopes as reconversion brings cutbacks and a reduction in working hours.

"American business men, too, are facing reconversion headaches. At the same time they are not unmindful of the workers' fears, for they know the fortunes of both are inextricably linked, and that management and labor go forward or slip back together. For my part, I shall oppose wholesale wage reductions after the war. On the contrary, I shall advocate progressive wage increases as improved methods permit increased production."

Mr. Johnston said he was anxious to see the stabilization policy continued for the remainder of the war.

"If it is allowed to fail, we lose the only anchor that we have against a spiral of rising costs and prices. Inflation can bring permanent benefits to no one. As has been pointed out many times, by increasing the cost of what government buys for war, inflation increases the national debt, already threatening to grow to unmanageable proportions."

Whether the Little Steel formula should be broken and wage increases granted to one-fourth of the nation's workers should be decided by the other three-quarters who will have to foot the bill, Robert M. Gaylord, president of the National Association of Manufacturers, told the board. Mr. Gaylord, who also is president of the Ingersoll Milling Machine Co., Rockford, Ill., called upon the board to summon representatives of other groups in the economy, including families of servicemen, farmers, educators, white collar workers, to express their views on the issue.

The plight of the small steel companies, should a wage increase be granted, was reiterated by Lauson Stone, president, Follansbee Steel Corp., Pittsburgh, and by Loren E. Souers, vice president, Continental Steel Corp., Kokomo, Ind. Both held the smaller companies were doomed if wages were allowed to rise.

Union's Claim Inconsistent

Mr. Stone said, in part: "One of the incongruities of the present case is that the union has taken the position that the big companies could well afford to pay or meet its 17-cent wage demand, and that the little ones, like ourselves, could not and were not able to pay it.

"Nonetheless, the union claims that all companies should pay the increased rate, and that price relief was not necessary. Now, I submit, gentlemen, these positions are inconsistent, untenable and untrue. The union did not need to tell me that my company could not afford to pay it. I know that, and price relief for us alone would be only an academic panacea."

One of the high spots of the hearing before the full board was Mr. Murray's attempt to inject the now famous "OPA survey" into the record. This purported study was prepared by a subordinate in the OPA and got into the hands of the union and some newspapers without the knowledge of Chester Bowles, OPA administrator, or other high OPA officials. The "leak" caused great discomfiture in the higher circles of OPA, and Mr. Bowles promptly disowned the "report."

Nevertheless, Mr. Murray included portions of it in his statement to the board, as follows:

"The steel industry had made a request for a general price increase of approximately 10 per cent. The study concludes that, and I quote, (a) 'there is at the present time no ground for an over-all increase in the price of steel' and (b) 'even in the event that the wage increase requested by the union were granted in full, the case for a price increase would not be persuasive. For even if the wage demand were granted in full, its effects upon average hourly earnings would be largely offset by the disappearance of overtime and the reversal of the labor upgrading process. These two factors account for 16 cents in average hourly earnings. As against this the wage comes to 17 cents.'

"Let us examine some of the data of this report pertaining to the break-even point and the level of profits before taxes at varying levels of output. These estimates are based upon data for the U. S. Steel Corp. which the report claims to be representative of the industry as a whole.

"The report finds that:

" 'Since 1939, output per man-hour has increased more than average hourly earnings. Consequently, labor costs are currently about 4 per cent below 1939 levels and 8½ per cent below the average level for 1935-39. This is due to two factors: The economics of capacity operation and those due to improvements in plant, equipment, and technology. These latter economics will result, even at prewar levels of output, in labor productivity substantially higher than prevailed before the war. In addition average hourly earnings, even at present basic wage rates, will decline substantially below current levels as premium payments for overtime are reduced and downgrading of labor occurs in a softer labor market.

" 'Reductions in materials costs may likewise be expected as wartime demands slacken.'

"The analysis further shows that: 'On the extreme assumption that there will be no decline from the 1943 levels in hourly earnings or in the prices paid for materials and services, the U. S. Steel Corp. has a break-even point at 52 per cent of capacity. At 75 per cent of capacity earnings would be $120 million and at 90 per cent they would be $210 million. These are to be compared with average profits of $66 million in the base period 1936-39.

Estimates Break-Even Point

" 'On the alternative and more realistic assumption that the wartime effects of upgrading and of premium payments will disappear from average hourly earnings and that costs of materials and services purchased will decline to 1941 levels, the break-even point is found at 35 per cent of capacity. Under these conditions, earnings at 50 per cent of capacity would be $78 million, and at 75 and 90 per cent they would be $240 million and $347 million, respectively.'

"The report continues that: 'If the wage increase were granted and the price increase denied . . . and if as is . . . likely, average hourly earnings were to fall by reason of the elimination of overtime and upgrading and material prices were to decline to 1941 levels, the U. S. Steel Corp. would break even at 47 per cent of capacity. Earnings at 50 per cent of capacity would be $13 million; 75 per cent, $154 million; 90 per cent, $250 million.' "

W. H. Davis, board chairman, threw out this part of Mr. Murray's statement on the ground that it was not part of the record made before the panel.

Calling upon the President to correct "this gross inequity" between workers' incomes and cost of living, these AFL leaders are shown at a session of the NWLB hearing on modification of the Little Steel formula. Left to right: William P. Frey, Matthew Woll and George Meany. Acme photo

California Industry Planning Broad Line Of Postwar Products

Production of items ranging from portable power plants and high-speed cutting tools to new and streamlined gadgets for household and business use projected in many of the area's 2000 war-born plants

LOS ANGELES

POSTWAR production by manufacturing plants here will include many new and revolutionary devices for aviation, agriculture and horticulture. Hundreds of new machines and devices are scheduled for manufacture as soon as wartime bans are lifted. These new products will range from portable power plants and high-speed cutting tools to new and streamlined gadgets for household and business uses.

This forecast of things to come is indicated by the hundreds of plans disclosed by local manufacturers in "off the record" panel discussions with the domestic trade department of the Los Angeles Chamber of Commerce. In these conferences, manufacturers are displaying plans and working models of proposed items, and discussing marketing problems.

The trend in the new production disclosed indicates a wide use of stainless and fracture resistant materials, with sturdier construction and fewer working parts than heretofore in many of the items.

It is in this production program that many of the 2000 war-born new plants are to be utilized. In 1939 there were 5500 manufacturing plants in the Los Angeles area, while now the total has reached 7500. It is in the production of items for which the West is now equipped with plant facilities and supplied with raw materials, but which have been produced in the East, that expanded plant facilities and wartime immigration will be employed.

It is pointed out by industrial leaders that more than half of the wartime expansion, other than in aircraft, has provided manufacturing facilities that can be used in bringing about a more balanced relation between production and consumption in this area, and that most of the expansion does not represent a duplication of former facilities.

For example, a recent survey indicates potential manufacturing here in the hardware field. In 1939 the western market purchased 14.4 per cent of the national production of hardware, while western production was only 2.6. This same lack of balance is to be found in many lines.

Los Angeles was only one-third industrialized in 1939 as compared with 32 other heavily industrialized centers. Only 5.4 per cent of the population was engaged in manufacturing as compared with 15.4 per cent as the average in these other centers. In 1939, local industries employed 150,000 workers; early in 1944 the total so employed was approximately 575,000. This does not mean, however, that the difference of 420,000 will have to be absorbed in peacetime manufacturing. It is the opinion of industrial leaders, that some 170,000 workers including housewives will go back to their former nonmanufacturing occupations, and that the postwar job of industry will be to absorb the added working population of 250,000.

Exodus of Workers May Rise

The postwar employment problem in this area may be eased by a larger proportion of wartime aircraft and shipyard workers returning to their original homes than earlier surveys indicated. While a survey of war workers taken in February of this year, showed that 86 per cent of the war workers from out of the state were planning to remain here, a recent survey indicates only 75 per cent now plan to stay in Los Angeles, 17 per cent plan to leave, while 8 per cent have not yet decided.

Other highlights in this survey disclose that only 58 per cent desire to remain in their present employment; the earlier survey indicated 63 per cent. Moreover, this survey discloses that an increasing number of workers wish to go into small business for themselves after the war. Whereas in the survey made in February, only 19 per cent of the workers were interested in small business for themselves, the recent survey shows 25 per cent.

The first war-born shipbuilding yard in this area to convert to peacetime activity is the United Concrete Pipe Corp.'s steel shipbuilding plant. This firm, now completing the last three of twelve 176-foot Army freighters, of which the first keel was laid in November of 1943, will start at once to build three and possibly four tuna clippers. These clippers are to be of steel, 125 feet in length and to cost $300,000 each. They are to be powered by twin six diesels and will replace ships of the tuna fleet, some of which were taken over by the Navy.

New contracts totaling $54,671,644 were approved during the last week of September by the WPB for this area. Individual contracts ranged from $43,467,149 for A-26 attack bombers to be produced by Douglas Aircraft at Santa Monica to electric switchboards and refrigeration plants for Av-1 coastal freighters.

The end of wartime pooling of scarce materials by public utilities in Southern California, Arizona and Nevada has been announced by the WPB here. By the system set up more than two years ago, more than $3,000,000 in copper and steel pipe, wire, cable and other materials have been located for the use

Postwar jobs for the thousands of war workers on the West Coast who will be dislocated by contract cancellations is a major problem for western industrialists and civic agencies. Plans are unfolding for increased manufacture of various devices for agriculture, horticulture and aviation and other civilian goods. NEA photo

Labor Shortage Still Acute in Coast Districts

Placing of additional war supply contracts in past month points up heavy need for manpower. Factory employment up

SAN FRANCISCO

NEW war supply contracts totaling $55,415,509 were placed with northern California plants in the month ended Sept. 15, according to the San Francisco WPB office. Major part of the new orders are for Pacific war munitions. The awards covered 37 prime contracts and involve the employment of 3652 additional workers.

Numerous other contracts placed with smaller war plants were not included in the total because they do not involve utilization of additional manpower. During the same period, construction projects numbering 653 were approved for a total cost of $10,171,437, and 166 projects costing $2,554,645 were disapproved.

These new contracts point up the continuing heavy need for manpower in this area. Job orders on file with the U.S. Employment Service in the San Francisco industrial area now number more than 26,000. Ship repair companies have requests for 3381 workers and ship conversion and new shipbuilding demands total 3874. The railroads need 2982 and a total of 1206 workers are wanted on the waterfront and in port activities. Chief need is for skilled workers.

Reflecting seasonal expansion of employment in fruit and vegetable canneries, factory employment in California in August increased 15,700 to 842,900. However, number of workers in durable goods industries declined by 11,300, with aircraft plants reporting a cut of 5300 from July and shipbuilding (excluding government yards) a decline of 3800.

Metal Stockpiling Drive Planned by Senators

New contracts for special assault transports and assault cargo vessels have been awarded to Western Pipe & Steel Co.'s South San Francisco yard, Kaiser's Richmond No. 2 yard, in Richmond, Calif., and Moore Drydock, in Oakland. Other Coast yards sharing in the orders are California Shipbuilding and Consolidated Steel, both at Wilmington, Calif., Kaiser yards at Vancouver, Wash., and Oregon Shipbuilding at Portland.

Termed by Secretary of the Navy Forrestal as a "vital and essential link in any operation we shall conduct in the Pacific," these vessels have been given top priority in the current naval-shipbuilding program.

of approximately 1000 utility companies in the Southwest from surplus inventories.

Much New Work Developing In the Pacific Northwest

SEATTLE

Increasing awards of projects involving shapes for nonmilitary purposes are noted in the North Pacific area. Potential demand is of large proportions awaiting relaxation in WPB regulations.

Reclamation Bureau received tender Sept. 30 at Fairfield, Mont., for the Sun River crossing, Piskkun canal, requiring 180 tons of reinforcing.

Star Iron & Steel Co., Tacoma, has a $246,000 contract for constructing a portal crane for the Puget Sound navy yard. Cyclops Iron Works, San Francisco, will build six cranes for the naval ordnance plant, Pocatello, Idaho, at $108,088 while Judson-Pacific Co., San Francisco, has a contract for nine cranes, same project, at $182,625.

The Vancouver, Wash., Kaiser plant is prepared to begin work on a 14,000 ton steel drydock for the Navy.

Portland office, WPB, has granted priorities for a $32,997 chip storage bin for Columbia river paper mills at Vancouver, Wash., and $29,780 for the Powers Davis Lumber Co., Lebanon, Oreg., for installation of a high speed planer and equipment. Columbia Aircraft Industries, Portland, has an award that will require top production until 1946.

Recent Navy awards in this area include: Gaasland Construction Co., Bellingham, Wash., $79,902 for gunneries building and $47,987 for overhaul shops at Arlington airfield; York Corp., $18,-637, for refrigerator equipment, Farragut, Idaho; J. B. Warrack, Seattle, $91,780, overhaul shop at Shelton, Wash., air station; Western Construction Co., Seattle, $77,675, marine railway, Whidby Island, Wash.

Republic Steel To Start Tests at Sponge Iron Plant

Defense Plant Corp. unit at Warren, O., will supplement scrap supply for electric furnaces at Canton plant

REPUBLIC STEEL CORP.'S new sponge iron plant at Warren, O., will begin test operations within a few days.

The unit, built by Republic for the Defense Plant Corp., has just been completed and now is being warmed up.

The sponge iron plant was built to test the worth of the old process of making iron in modern-day emergencies. Most steel and iron executives believe the sponge iron method will be more expensive than the modern blast furnace process. Proponents contend it may be possible to erect sponge iron plants more quickly and inexpensively than blast furnaces in emergencies.

The sponge iron is expected to show some properties more suitable than ordinary pig iron for some special uses.

Republic plans to use iron ore concentrates from its New York state mines in the sponge iron plant which will ship its product then to the Canton district electric furnaces to bolster supplies of scrap. The company has had much trouble in getting supplies of scrap free of alloys for the Canton furnaces.

The sponge iron plant originally was to be built at the Youngstown plant but later it was decided to move it to Warren because Republic has better facilities there for desulphurizing the coke oven gas used in the process, and was able to save the cost of a unit at Youngstown.

RETRIEVER: Baldwin-built M-3 tanks are being used in Italy as tank retrievers and for towing American heavy guns. Above one of the tanks, with turret off, is carrying a big gun to the front. Armament in front of the retriever is pure camouflage

Ohio Labor Dislocation On V-E Day To Be Slight

CLEVELAND

Order cutbacks and cancellations following Germany's defeat will result in dismissal of only 5 per cent of Ohio's present labor force of 3,588,000 persons, and employment will continue at a level substantially above that ever reached in any peacetime year, Robert C. Goodwin, War Manpower Commission director, Fifth region, states.

On this basis defeat of Germany would mean none of the workers in the 1940 labor force, numerically speaking, will be affected, and only about one out of five of those who have taken jobs during the wartime expansion will be released.

A strikingly large proportion of Ohio manufacturers are making war products today which are identical with or very similar to their peacetime production. There are very few serious problems of physical reconversion in the state, thus indicating a rapid reconversion of industry once materials and manpower become available.

An indication of the rapid reconversion possibilities is illustrated in a recent survey by J. W. Vanden Bosch, Cleveland Chamber of Commerce analyst, showing that 80 per cent of Cleveland's industry will require little or no reconversion in the swingover from war to peacetime manufacturing. In many plants the changeover could be accomplished within a few days, and in some it would mean little more than "using different shipping tags", the report states.

August Pig Iron Output at 5,210,222 Tons Shows Gain

PIG IRON production in August totaled 5,210,222 net tons, an increase of 53,408 tons over July output, but falling short 224,018 tons of the all-time high reached in March, according to figures by the American Iron and Steel Institute. Included in the August total is 49,967 tons of ferromanganese and spiegeleisen, compared with 62,665 tons in July. Percentage of capacity operated in August was 90.2, based on the new capacity figures as of July 1, compared with 91 per cent in July on the old basis. For the year to date the industry has operated at 93.4 per cent.

Cumulative pig iron production for eight months totals 41,848,656 tons, against 40,681,821 tons in the corresponding period in 1943. During the latter period the rate of operation was 98 per cent of capacity as then constituted. Details of August production are as follows:

District	Pig iron	Ferro, spiegel	Total: August	Total: Year to date	Total: Per cent capacity
Eastern	930,277	23 897	954.174	7,662.545	88.3
Pittsburgh-Youngstown	2,114 926	13,324	2,128.250	17,103.488	93.5
Cleveland-Detroit	518.571	......	518.571	4,185.532	92.4
Chicago	1,112.061		1,112.061	8 890.777	93.3
Southern	333,994	12,746	346,740	2,890,474	81.3
Western	150,426		150,426	1,115.840	62.5
Total	5,160,255	49,967	5,210,222	41,848,656	90.2

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.

Alloy Steel Output in August Increases

Production of alloy steels in August totaled 874,716 net tons, about 12 per cent of total steel production during that month, according to a report by the American Iron and Steel Institute. In July alloy steel production was 854,321 tons and in August, 1943, it was 1,097,634 tons.

Open-hearth furnaces in August produced 576,690 tons, the remaining 298,026 tons coming chiefly from electric furnaces.

Dominion Lifts Restrictions on Some Products

Railway shops resuming manufacture of locomotives and rolling stock. Steel Co. of Canada to install strip mill

TORONTO, ONT.

ORDERS restricting the manufacture in Canada of civilian metal products have been revoked by the Prices and Trade Board to expedite reconversion.

Silver plated holloware, humidifiers, incandescent lighting equipment, bath tubs, and metal furniture and parts are involved. Manufacture may be resumed as materials and labor become available.

Orders which standardized some finished consumers' products were also revoked. The chairman of the control board stated that it was not expected that all standardization practices would be abandoned. Some will be retained voluntarily by industries.

General cancellation of remaining controls over finished metal products is expected after defeat of Germany.

H. G. Hilton, president, Steel Co. of Canada Ltd., Hamilton, announces the directors have authorized the second step in the installation of a complete modern wide strip mill.

"Work is proceeding on the new buildings which will cost several millions of dollars and cover an area of about four acres. By approval of this heavy investment, the company's management has given tangible evidence of its faith in the future growth and prosperity of Canada and its anxiety to do its part in providing employment for Canadians when peace returns. It is hoped that the new plant will go far toward absorbing the output of additional steel producing capacity which has been installed to meet war requirements. Plans for the complete strip mill were well advanced several years ago but war prevented its construct.on. However, during the war two units of the project—the tin plate mill and 110-inch plate mill—have been completed at a cost of $6 million.

According to word from Ottawa, Canadian railway shops now are getting back to the production of locomotives and rolling stock instead of munitions. A number of new refrigerator cars soon will roll out of Canadian National shops and some big mountain-type locomotives are being built. A brisk demand for railway equipment not only in Canada, but in all countries, is expected and it is believed a sizeable export market for cars and locomotives will be available to Canadian shops after the war.

Some Latin-American countries are looking to Canada as a source for ships after the war. Orders already have been placed with Canadian shipyards by at least one South American country and more are expected. One of the immediate postwar tasks of Canadian shipyards will be conversion of a lot of war-built ships to peacetime use. This will involve, among other things, the installation of refrigeration equipment on ships and the installation of passenger accommodations on some smaller-type freighters.

POSTWAR PREVIEWS

WAGES— Industry spokesmen warn general increase will cause inflation followed by deflation. May mean ruination of small steel companies. See page 96.

WEST COAST— Plans for postwar manufacture of new lines of civilian goods offer promise Pacific states may be able to hold major portion of wartime gains. See page 98.

FOREIGN TRADE— State Department official advocates postwar trade be directed by private interests. See page 102.

SURPLUS PROPERTY—Plans for disposal shaping up. Considerable quantities already sold. See page 105.

CONTRACT TERMINATION—New regulations by Office of Contract Settlement will facilitate settlement of terminated contracts. See page 106.

PRODUCTION CONTROL— New system inaugurated by Cleveland plant makes possible 25 per cent increase in output without increase in manpower or facilities. See page 120.

RESISTANCE WELDING— New system for balanced 3-phase resistance welding equally distributes load on power line, extends scope of process to include joining of ¾-inch steel plates. Lower original cost and reduced operating cost are features most likely to attract postwar production planners. See page 126.

LEAD PLATING—Lead may find increasing applications as metal coating after the war because smooth, uniform and dense deposits within close tolerances now are being obtained. See page 128.

METAL ROLLING—Possibilities are seen for adaptation of new Krause mill to hot and cold rolling of steel. Unit now in commercial production on copper and brass embodies entirely different principles, with work being held in tension by gripper dies while rolls are moved by frictional contact between cam plates and metal. See page 248.

Electric Furnace Group Meets in Pittsburgh

Widespread interest was manifested in papers and discussions at the technical sessions of the second annual conference on electric furnace steel sponsored by the Electric Furnace Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, held at the William Penn hotel, Pittsburgh, Oct. 5-6.

Joint technical session on acid and basic electric furnace practice was held the first day of the conference and separate sessions the final day. The procedure adopted at the first annual meeting of the committee was followed in this year's conference, namely, the presentation of a paper followed by 5-minute oral discussions. A detailed report of the subjects discussed at all sessions including the performance and maintenance of equipment for electric arc furnaces, refractories, melting and oxidizing, refining, deoxidizing and pouring, as well as details concerning acid practice, will be presented in next week's issue of STEEL.

C. M. White, vice president in charge of operations, Republic Steel Corp., Cleveland, presided at the annual dinner Thursday evening. Richard Read—an old timer in the art of making electric furnace steel—recounted in detail the incidents involved in getting out the first heat of steel in the heroult-type electric furnace back in 1906 at the Halcomb Steel Co., Syracuse, N. Y., along with Mr. Heroult.

Gray Iron Founders Meet Oct. 10-11 at Cincinnati

Gray iron foundry executives from all parts of the country will discuss postwar questions confronting the industry when they meet in Cincinnati Oct. 10 and 11 for the 16th annual production planning conference of the Gray Iron Founders' Society. Sessions will be held in the Netherland Plaza hotel.

Urges Postwar Foreign Trade Be Directed by Private Interests

State Department official says government control of foreign trade after the war would not be in keeping with American traditions. Return to economic warfare similar to that after last war would not be wise

THAT our foreign trade after the war should be carried on through private interests is one of the main conclusions in a recent address by William A. Fowler, chief of the State Department's division of commercial policy. Delivered at a Christ Church forum in New York, it is significant as representing prevailing views in the State Department.

Mr. Fowler did not make direct reference to the ideas of some of the United Nations as the Union of Soviet Socialistic Republics, or Great Britain, which countries visualize considerable, if not complete, government preoccupation with and control of foreign trade. He warned, however, that such government control of foreign trade, as far as the United States is concerned, would not be in keeping with our traditions.

"During the war, a very large part of our foreign trade has been under government regulation or management. This has been generally accepted as necessary to the most effective mobilization of our resources," said Mr. Fowler. "The same is true of the meshing of our wartime trade controls with those of our allies—particularly the United Kingdom and Canada—through combined boards.

"Some postwar trade plans contemplate a rather extensive regulation of private trading in time of peace, and a considerable amount of state trading, that is, government purchases of foreign goods for resale in the home market, or government purchases of domestic products for sale abroad. Several forms of federal foreign trade boards also have been suggested. Such a board would control every trade transaction through its power to give or withhold a required license.

"Traditionally, of course, the American people have favored private enterprise and private initiative, and most Americans realize that government control of foreign trade would mean government control of domestic business also."

While there is wide agreement that we should not again become parties to the type of economic warfare we and others engaged in after 1918, and that we must learn how to live in harmony with the peoples of other countries, said Mr. Fowler, achievement of this kind of a world will depend, to a very important degree, upon co-operative action "to remove unreasonable trade barriers, in order to make possible a progressive expansion of international trade after the war." We should not be lulled into the belief that, without any special effort, we can roll along toward these objectives, he warned. There is urgent need for general, nonpartisan agreement on a dynamic trade policy suited to the postwar needs of the country.

"Early agreement on such a policy is needed for several reasons," said Mr. Fowler. "First, the urgency of the problem of reconverting production from a wartime to a peacetime basis is each day becoming more apparent. A definite foreign trade policy would provide the businessmen of America, and of other countries, with a basing point to guide them in making their individual plans for the future.

Expanded International Trade Needed

"Second, there must be a solid foundation for the resumption and expansion of private international trade as soon as hostilities cease. If we are to have productive employment of those now engaged in war work, and of the millions now serving in the armed forces, we must not allow restrictive prewar trade barriers and wartime trade restrictions to stand in the way of earliest and fullest possible development of mutually beneficial trade.

"Moreover, as long as there is uncertainty about postwar trade relations, there will be uncertainty about general postwar economic relations. The currency stabilization and international investment projects worked out at the Bretton Woods conference merit support as integral parts of a broad program of international economic co-operation. The successful functioning of these proposed financial institutions, however, will be closely related to the success of international efforts to bring about an expansion of trade, on a multilateral basis, through appropriate action in regard to trade barriers and other matters affecting the volume and flow of trade between countries."

There is a sharp contrast, warned Mr. Fowler, between a trade program based largely on a policy of importing principally raw materials for industrial use, or national stockpiles, and one based upon a worldwide reduction of restrictive trade barriers of all kinds.

"Increased imports of raw materials alone will not begin to solve the postwar trade problem," he said. "What is needed is the substantial reduction of all restrictive tariffs, elimination of harmful trade discriminations, and the removal of

OBJECTS TO PAC, OUSTED: Harry Morgan, former chief shop steward at Chicago Flexible Shaft Co., Chicago, told a Dies subcommittee that he had been ousted from United Electrical Workers—CIO because of his objections to the program of the CIO-PAC. Elmer Churchill, an associate of Mr. Morgan, testified he had resigned because of political activity. Shown above, left to right, are: Representatives J. P. Thomas, New Jersey, and John M. Costello, California; Harry Morgan and Elmer H. Churchill. NEA photo

unreasonable prohibitions and restrictions on trade, throughout the world.

"International co-operation is needed also to deal with restrictive practices of monopolies and cartels, and with commodities the world supply of which tends to exceed effective demand. What is needed, in short, is a comprehensive program of action along the lines indicated in the Atlantic Charter, to which the governments of all the United Nations have subscribed or adhered, and in Article VII of our mutual-aid agreements with many of the same nations.

Should Maintain Tariff Equality

"The suggestion is sometimes made that the reduced rates of duty on selected items provided for in an agreement with one country should be applied only to imports from that country, while similar articles from other friendly countries remain subject to higher rates of duty. That would be a good way to lose friends and business too. If this country ever threw overboard its traditional policy of tariff equality— known as the unconditional most-favored-nation policy —our export trade would immediately lose valuable benefits and protection. It would at once become vulnerable to counter discriminations on the part of other countries, and our general relations with them would be embittered. Our international obligations stand in the way of our adoption of any such suggestions. So does plain common sense."

Mr. Fowler expressed the hope that the present stage of plans and counter plans will soon be over, and that a policy will emerge before long.

Encourages Prompt Disposal Of Termination Inventories

To encourage prompter disposal of contract termination inventories, W. L. Clayton, surplus war property administrator, has authorized disposal agencies to apply for "waiver or modification" of some or all of the requirements of the statement of pricing policies issued last April.

At that time, Mr. Clayton declared that termination inventories should be sold much more rapidly, not only to get the goods off the market, but to reduce the strain on government storage facilities. The slow movement of termination inventories then was assigned by Mr. Clayton to the unwillingness of contracting and termination officers to run the risk of criticism for making sales at prices that might be considered unduly low. His statement, therefore, set up a formula which, in a general way, provided that goods might be sold at going market prices or equivalent.

The new revision makes it possible for disposal officers of governmental agencies to submit for approval any bids they may receive, thus relieving them of the responsibility of acting on these bids on their own authority.

Economic Warfare Operations of FEA Help Speed Allied Victories

ALLIED successes are being speeded through the economic warfare operations of the Foreign Economic Administration with information obtained directly from inside the enemy's lines and by measures to keep strategic materials from being smuggled or traded into the hands of the enemy, according to a report to Congress about the work of the FEA.

Through the efforts of the FEA, United Nations' Air Forces have received information necessary in planning and carrying out the strategic bombing offensives that have smashed German and Japanese aircraft factories, oil refineries and other plants, railroads, shipyards, and supply centers. At the same time the foreign procurement and development operations secured strategic materials from mines and forests and farms all over the free world to enable the United States to manufacture enough weapons and other war supplies to give American forces and the forces of our allies the overwhelming superiority over the enemy that is now hastening final victory.

The work done by the FEA in connection with the liberation of enemy-occupied areas affects not only the immediate security of our forces during the final offensives now under way. It also affects the security of this country after final victory is won. FEA assists in determining basic needs and in buying essential civilian supplies in the United States which the armed services provide during the period of military operations as an essential part of those operations.

It also procures many essential civil-

ALUMINUM: Member of the Allied forces in the Rougemont area, France, inspects a carload of aluminum left on a siding by the retreating Germans. There probably is enough metal here to produce alloys for several fighter planes. NEA photo ian supplies both for the paying governments of the liberated countries and for the United Nations Relief and Rehabilitation Administration.

According to the report to Congress, the economic warfare operations of the FEA have seriously undermined the enemy's economic ability to wage war. These operations have been carried out in two stages. Information has been gathered and analyzed about the aircraft plants, oil refineries and every other important phase of the German and Japanese war economy.

This information has been put to use in two major ways. It has been used by the armed services in determining Allied strategic bombing objectives and in guiding sabotage operations. It has also been used to guide the blockade and preclusive buying operations by which shipments of those supplies most needed by the enemy from the outside world have been cut down or eliminated. In all these operations FEA works closely with the War and Navy Departments, Office of Strategic Services, State Department, and the military intelligence and economic warfare agencies of our allies.

Blocks Trade With Germany

War trade agreements and preclusive buying have been the principal weapons used to reduce and if possible eliminate the sale to Germany of raw materials and manufactured goods produced by European neutrals. Such action has prevented the Germans from obtaining much tungsten from Spain, chrome from Turkey, Swedish ball bearings, and a number of other items.

Phenomenal success of America's war industry in producing materials of war has been due to many factors, one of the most important of which has been the ability of the nation's war industry to get strategic and critical raw materials. Although the United States is richly endowed with natural resources, many of the critical raw materials essential to the success of the war program are produced in insufficient quantities or not at all. According to the War Production Board, 48 of the 136 raw materials listed as strategic and critical at the outset of the war were virtually unprocurable within this country.

The program which effectuates lend-lease is a combined operation of many of this country's government departments from which the FEA exercises overall responsibility. Fifteen per cent of the money the U. S. spends on the war effort is for lend-lease supplies and services used by the allies toward winning the war. At the same time this country has received over $3 billion worth of supplies and services for our forces as reverse lend-lease aid, without payment.

Overseas staffs of the FEA are scattered throughout the world. They are located in such places as China, Australia, Iceland, Mexico, Central and South America, England, Russia, India, and North and South Africa.

Surplus Disposal Plans Shaping Up

Various government agencies concerned with problem seek to develop policies which will facilitate absorption without interfering with normal business and industry

SURPLUS property disposal plans of the government are shaping up rapidly though some uncertainty as to final policies is evident due to delay of President Roosevelt in signing the Surplus Property Disposal bill recently passed by Congress.

This bill, it will be recalled, is the measure which lodges determination of policies in a 3-man board, a provision which was passed over the objection of W. L. Clayton, who has been serving as surplus property administrator by executive order.

Before the measure was passed, Mr. Clayton served notice that he would resign his government post and return to private business if administration of surplus property was committed to a board rather than a single administrator.

Meanwhile, the various agencies concerned with disposal problems are going ahead with their plans. In fact, considerable surplus already has been disposed of and indications are the volume is mounting. Last week, for instance, the Defense Plant Corp. reported it had sold 789 machine tools to the Chevrolet division, General Motors Corp., representing certain tools under lease to that company. The sales price was $2,379,000 and was arrived at under the price formula for disposal of government surplus used machine tools announced some time ago by Surplus Administrator Clayton. The tools averaged 22 months in age and the sales price amounted to approximately 61 per cent of the cost.

Lessees May Buy Tools

Expectations are the government will be holding thousands upon thousands of machine tools when the war ends. Some of this equipment will be in good shape, some of it badly worn, and some of it suitable only for scrap. In order to expedite reconversion and facilitate prompt and orderly disposal of these tools, RFC regional offices are offering to sell such tools to lessees now in possession of them and to others. To date 11,159 used machine tools, costing approximately $58,600,000, have been disposed of; 3535 were sold to private purchasers in 1740 individual sales, and 7624 were disposed of within the government.

With respect to disposal of war plants owned by the government, detailed engineering surveys of each plant are being made. These surveys will enable the government to bring together all of the essential data necessary to present to a wide range of buyers the advantages which the plants have to offer. Advertisements offering these plants for sale already are being placed in the newspapers and other media.

Many of the plants being offered will not be ready for immediate occupancy by a purchaser. Sale agreements provide for taking over of the plants only after the war work now in them has been completed and they have been finally released from any further war contracts.

Purchasers will be given the opportunity to purchase entire plants. However, the view in Washington is that many of these surplus war properties can only be absorbed by private industry through multiple tenancy.

It is the intention of the government to dispose of surplus materials and equipment as far as possible through regular channels of trade. For instance, recently it was found impractical for the government to dispose of surplus trucks directly. Essential servicing would be entirely out if the trucks were sold by the government directly to users.

Plans Orderly Disposal

In connection with the disposal of surplus materials, it is pointed out in responsible quarters that many of the items offered can be expected to return only a fraction of their original cost. This is because they are special purpose in nature and can find little, if any, application in civilian life. At the same time, however, it is not the intention of the government to dispose of any goods at so-called bargain prices to speculators. What the government aims to do is as far as possible to channel back to individual manufacturers the latter's products. They hope in this way to prevent a flood of surplus in competition with newly produced goods of manufacturers who will be faced with the problem of providing maximum employment in the postwar period. It is suggested that orderly disposal of surplus goods could be fairly well assured if manufacturers would buy back their own products and channel them into consumption, a percentage of new orders being filled from the surplus stocks acquired. This plan sounds logical on the surface, but the problem is complicated by the fact that in many instances surpluses are composed of both new and used goods and consequently are not looked upon with favor by many manufacturers.

There is little doubt that much of the surplus will eventually find its way to scrap. The government, planning to prevent the flooding of the various markets, has been giving thought to using idle war plants that cannot be sold for storage. Also, plans are under way for building of prefabricated storage facilities throughout the country wherein unsold, but usable, material can be stored until such time as a market for it can be developed without unduly disturbing the national economy.

New OCS Regulations Facilitate Settlement of War Contracts

Office of Contract Settlement provides for pretermination settlement agreements and for purchase by contractors of government-owned equipment or for its removal within 60 days, except when necessary for other war purposes

SETTLEMENT of terminated war contracts has been facilitated by the issuance of two new regulations by the Office of Contract Settlement. Regulation No. 3 provides for pretermination settlement agreements, permitting contracting agencies to make settlement agreements with war contractors in advance of actual termination of contracts.

Regulation No. 4 gives the contractor whose war contracts have been terminated the opportunity either to buy government-owned equipment or to have it removed promptly from his plant within 60 days after request for removal, except when necessary for other war purposes.

Pointing out that, by lease or other arrangement, the government has furnished much equipment to war contractors, Robert H. Hinckley, director of OCS, said it was necessary as part of the war contract settlement process to remove government-owned equipment from plants with terminated contracts and make room for other operations or give the manufacturer a chance to purchase it. In many cases, the lease agreements have required contractors to hold equipment in standby condition. Regulation No. 4 directs that, except when necessary for other war production or the national defense, these standby provisions will be waived.

Government Seeks Storage Space

In publishing this regulation, Mr. Hinckley said it is important for manufacturers to know promptly what equipment they will be allowed to purchase and to know that unwanted equipment will not be left to crowd their plants. At the same time, he urged manufacturers wherever possible to aid the government by providing temporary storage space in their plants for unwanted equipment.

Regulation No. 4 provides the methods by which the contractor will put in his bid for purchase of the equipment or will request its removal. It specifies the procedures the government agencies must follow to meet these requests where they are not consistent with the needs of war production or the national defense. It sets up the mechanism for another procedure in preparing industry for its peacetime tasks.

The final paragraph of the regulation urges both industry and government agencies to plan now for the actions they will take upon the defeat of Germany. The prices at which machinery can be purchased and the disposition of it can be settled now as well as later, it points out. By planning and scheduling now, both industry and government will find the task easier when V-E Day arrives.

Regulation No. 3 was issued to help war contractors and government contracting agencies settle terminated war contracts faster.

"The purpose of general regulation No. 3 is to clarify the right of the contracting agencies to make settlement agreements in advance of actual termination," Mr. Hinckley said. "These agreements may cover one or more of the elements that will be involved in termination claim. They are to be used when they will substantially facilitate settlements, plant clearance, reconversion to civilian production or the efficient use of materials, manpower and facilities, or will otherwise promote the objectives of the Contract Settlement act of 1944.

"Experiments have now established that it is frequently possible to negotiate such agreements with contractors ahead of time. Where this can be done, it will result in great savings in the time required for the contractor to reconvert to peacetime work. It will thus greatly minimize the dislocation and unemployment that might otherwise result from contract termination.

"The Procurement Policy Board of War Production Board has had the subject under consideration for some time, and has now recommended to the director of contract settlement, as has the Contract Settlement Advisory Board, that pretermination settlement agreements be used as widely as possible. The War Department has had some experience in negotiating agreements of this type, particularly in the textile field, and in some phases of ordnance production. These experiments indicate the great desirability of agreeing beforehand, where sufficient data is available to permit reasonable forecasts on a sound commercial basis, on items such as the unit cost of the inventory which the contractor will have on hand at various stages of manufacture, whether this inventory is to be scrapped, taken over by the government, or retained by the contractor, and the prices which should apply if the contractor plans to keep it.

"To the extent that the contractor agrees to retain inventory or work in process, these agreements will materially reduce the amount of surplus which comes into the government's hands for ultimate disposition. They will also permit the contractor to plan his peacetime production on an assured basis and avoid temporarily shutting down his production lines, as he might have to do if a similar agreement with the government had to be negotiated after he received his termination notice.

"Where the amounts involved are small and detailed calculations would not be worthwhile, it will frequently be possible to agree with the contractor on a lump sum payment in complete settlement of his claim under the terminated contract. This may even be possible in a limited class of cases involving larger amounts where unusually reliable data are available.

Use for Subcontracts Urged

"Contractors have shown great enthusiasm in working with the agencies on such agreements, and in seeking to make similar agreements with their subcontractors. This procedure affords just as much opportunity to speed up the settlement process for subcontractors as for prime contractors. Its use for subcontracts is therefore highly desirable; and in appropriate cases where it is feasible to do so, contractors should attempt to work out such agreements with other subcontractors before termination."

Previous regulations issued by OCS provided for T-loans and for partial payments. These steps have been recommended by the Contract Settlement Advisory Board, composed of representatives of the War, Navy and Treasury departments, United States Maritime Commission, Foreign Economic Administration, Reconstruction Finance Corp., War Production Board, Smaller War Plants Corp. and the attorney general.

Tool Steel Scrap Price Schedule Revised

Maximum molybdenum content of scrap that may be priced as segregated high and medium tungsten steel scrap (types 1 and 2), formerly fixed at one per cent by specifications of the tool steel scrap regulation No. 379, has been increased to one and one-half per cent, the Office of Price Administration has announced, effective Oct. 7. The maximum molybdenum content was erroneously reported in the previous issue of STEEL.

Stove Manufacturers Accept Certificate-Free Orders

Orders may be placed now by dealers and distributors for the coal and wood heating stoves that will be certificate-free after Oct. 15 but the stoves cannot be sold or held out of stocks for the later certificate-free deliveries, the Office of Price Administration has announced. This will help manufacturers schedule production to meet non-rationed demand.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

COPPER WIRE MILL PRODUCTS: Copper wire mill warehouses now are authorized to enter warehouse stock replacement orders for copper wire mill products with producers or other warehouses provided such orders are to replace copper wire mill products (equivalent number of pounds of copper content) previously delivered from warehouse stock, in accordance with CMP regulation No. 4, and not previously ordered from any source. Each order is to be marked "warehouse stock replacement order pursuant to the provisions of direction 4 to CMP regulation 4." Form WPB-3009 delivery reports are no longer required in the absence of other specific instructions from WPB. At the same time, "warehouse replacement" authorization letter WPBI-1047 (CMPL-485) is canceled.

L ORDERS

CAST IRON UTENSILS: Order L-30-c, controlling production of cast iron kitchen utensils, has been revoked, since pig iron is no longer critical. Manufacturers now can make any desired type of cast iron ware but production is not expected to increase immediately because all cast iron ware manufacturers are producing at capacity with facilities not needed for war work. (L-30-c)

UMBRELLA FRAMES: Order L-36, governing production of umbrella frames, has been revoked. Use of iron and steel in the production of this product will continue to be controlled by means of allotments under the Controlled Materials Plan. (L-36)

CONSTRUCTION: Any piece of building service equipment authorized or rated by WPB on a special application form, or any piece of processing or service machinery or equipment whether or not specifically approved, may now be installed in an existing building without permission under order L-41, regardless of cost limits. Building alterations required in connection with the installation may be made, but no new buildings or additions to existing buildings may be constructed. Materials required for the installation or necessary alteration may be obtained under direction 15 to CMP regulation No. 5. (L-41)

BRIGHT WORK: Dual control over the use of so-called bright work in the production of automobiles, accessories and replacement parts has been eliminated by the revocation of order L-69, which had been issued March 14, 1942, when chrome, nickel, cadmium and other materials used for plating were in critically short supply. Subsequently issued conservation orders, such as M-65 for cadmium, M-18-b for chromic acid, M-9-c for copper, and M-6-a and b for nickel, which restrict the use of these critical materials to essential war purposes, remain in effect. The localization of the controls over these materials in the respective orders will simplify the process of making them available for civilian use as war demands are reduced and the supply becomes more plentiful. (L-69)

BATTERIES AND PORTABLE LIGHTS: Flashlight cases and other portable electric lights now may be sold to fill unrated as well as rated orders within the production and shipment quotas assigned to manufacturers by the WPB. During the fourth quarter, manufacturers will be assigned a specific unrated quota.

Production of "B" hearing aid batteries is now authorized on an industry-wide basis. (L-71)

METAL STORM WINDOWS: Metal storm windows now may be made of aluminum or magnesium, or from metals other than these two provided the materials are obtained from idle or excess inventories. Restrictions on the manufacture of metal windows remain unchanged, however. They may be made only (1) to fill purchase orders from the Army, Navy, Maritime Commission or War Shipping Administration when required by specifications, or (2) to fill orders with preference ratings of AA-5 or better. (L-77)

CONSTRUCTION MACHINERY: Order L-196, which controlled the sale of certain types of used construction machinery, has been revoked. The order had required distributors and contractors owning shovels, cranes, draglines, motor graders and track-laying tractors to register their equipment in WPB regional offices, to report change of status of the equipment, and to obtain WPB approval of sales with certain exceptions. (L-196)

FOUNTAIN PENS AND MECHANICAL PENCILS: Order L-227, governing the manufacture of fountain pens and mechanical pencils, and order L-227-a, covering pen nib production, have been revoked. Use of copper and copper-base alloy for these items is prohibited by order M-9-c. Carbon steel and other critical materials are available in small quantities. (L-227, 227-a)

FOOD DEHYDRATORS: Order L-308, governing production of domestic food dehydrators, has been revoked. (L-308)

INDEX OF ORDER REVISIONS

M ORDERS

IMPORTS: Copper and brass scrap, tin plate scrap and crude metallic mineral substances are among the 16 commodities which have been removed from governmental import control. Other commodities removed from the restrictions of order M-63 were a group of ferroalloys (leaving only chrome and manganese under import control in this category), columbium ore (columbite) or concentrates, rutile, zirconium ore, tungsten ore and concentrates, vanadium ore. (M-63)

PRICE REGULATIONS

METAL UPHOLSTERY SPRINGS: Several minor changes in the maximum price regulation covering metal upholstery springs, constructions and accessories and in the price order covering inner constructions for dual purpose sleeping equipment have been made by OPA. The schedule for spring clips has been deleted from the upholstery spring regulation and all prices for spring clips now will be governed by the pricing provisions of the general maximum price regulation, which sets prices at their highest March, 1942, levels. A new price schedule is added covering the single cone bedding coil, knotted one end, 11½ gage, with a maximum price of $7.80 per hundredweight. (Nos. 188, 548)

Conservation Division, WPB, To Be Discontinued on Oct. 31

ON THE recommendation of Howard Coonley, director, Conservation Division, War Production Board, J. A. Krug, chairman of the board, has decided to discontinue that division as of Oct. 31. This is in conformity with WPB's policy to terminate promptly any operations deemed unnecessary.

Mr. Krug said that the diminishing amount of work remaining to be done in connection with conservation can be handled satisfactorily at this stage of the war effort by other divisions of WPB. He also said that this action does not affect activities of the Salvage Division, nor does it mean there will be any lessening of emphasis on such government programs as paper salvage and conservation.

At the height of the WPB activities, the Conservation Division had over 150 engineers, chemists and metallurgists on its staff. Among the accomplishments of the division are, Mr. Krug said:

"By means of writing federal specifications, emergency alternate specifications, and war amendments to the number of over 800, immense quantities of critical materials were saved and transferred to war purposes.

"By substituting materials that were in plentiful demand for critical materials, the production of many more munitions was made possible.

"By simplifying types, sizes and varieties of articles, the capacity of production was much increased and critical materials were saved.

"By standardizing measurements and equipment, material was saved, production was increased and interchangeability of implements of war was greatly promoted.

"Special programs such as the national emergency steel specification project to increase production within existing facilities; the design guides and directives to control strategic materials used in construction; and the die casting program to quicken production as well as to conserve copper and zinc all aided materially in getting supplies to the armed services.

"It is impossible to estimate the tonnage of critical material, man-hours, transportation capacities, etc., that have been saved by the techniques of the Conservation Division, but it is safe to say that the war has been shortened an appreciable length of time by their application."


Molybdenum steel bolts hold parts fast at elevated temperatures

MIRRORS of MOTORDOM

By A. H. ALLEN Detroit Editor, STEEL

New incorporations by Fishers revive rumors as to what activities the brothers will engage in, but do little to explain their future plans. Reconversion problems of auto industry aired for benefit of newsmen. Opinions are divergent

WHILE at least of more than passing significance, announcement of incorporation of Fisher Bros. Inc., Delaware and Detroit, and Fisher Motor Car Co., Delaware and Detroit, with 1000 no-par common shares each, does little to clarify future plans of the fabulous cash and securities-laden Fisher brothers, recently retired from General Motors Corp. It may logically be deduced they would be interested in building and selling some airplanes and motor cars, but where, when, who, how and what are still vague.

In respect to motor cars, there is one report, originally unearthed and made public by a dawn-patrol barroom columnist for a local paper, which bears further examination. It runs to the effect the Fishers are contemplating outright purchase of the Oldsmobile division of General Motors at Lansing, Mich., payment being in General Motors stock the brothers now own. Such a move makes sense in a number of respects.

First consider that by the sale of the Oldsmobile division, GM at one stroke removes an "overlapping" contender in the Buick and Pontiac markets, and at the same time absorbs a large block of its stock held by a single interest not actively connected with the corporation's management. This acquired stock could be redistributed to the public and thereby enlarge the cross section of GM ownership, which is good public relations and a smart financial maneuver.

Next consider that absorption of Olds would permit a consolidation of supervision which could react to the benefit of the four other divisions, especially when it is considered the corporation is planning roughly a 50 per cent increase in peak output which would place new demands on supervision. Actually it is reported Chevrolet is moving toward output of 9900 cars a day, Buick 3600 and Pontiac 3000 in the peak postwar period, comparing with prewar peaks of about 6000, 1200 and 1500, respectively.

GM in recent years has accounted for better than 40 per cent of the output of the entire automobile industry. In these days particularly, it is not an altogether healthy position to lead other production by such a wide margin, so the disposition of the 10 per cent of GM production furnished by Olds might have some merit.

On the adverse side is the loss of the tremendous values built into the name Oldsmobile over a long span of years, along with the valuable Oldsmobile and Fisher Body plants in Lansing. Conceivably, Oldsmobile could be retained as a member of the family by consolidating its production with, say, Pontiac, but this of course offsets a number of the plus values just recited.

From the Fishers' side of the fence, the deal would provide them with a fairly well integrated automobile production facility outside the labor hot spots of Detroit and Flint. Recently built is a large and modern heavy forge shop with the latest types of forging and upsetting equipment. A nearby body plant handles this phase of car building, and in or near Lansing are scores of important automotive suppliers who can make prompt shipments. No foundry is operated by Olds, but there is ample room for expansion of the property and there are several large sources not too distant which might be called on for motor blocks, flywheels, transmission cases and other cast components.

Two GM Excutives Resign

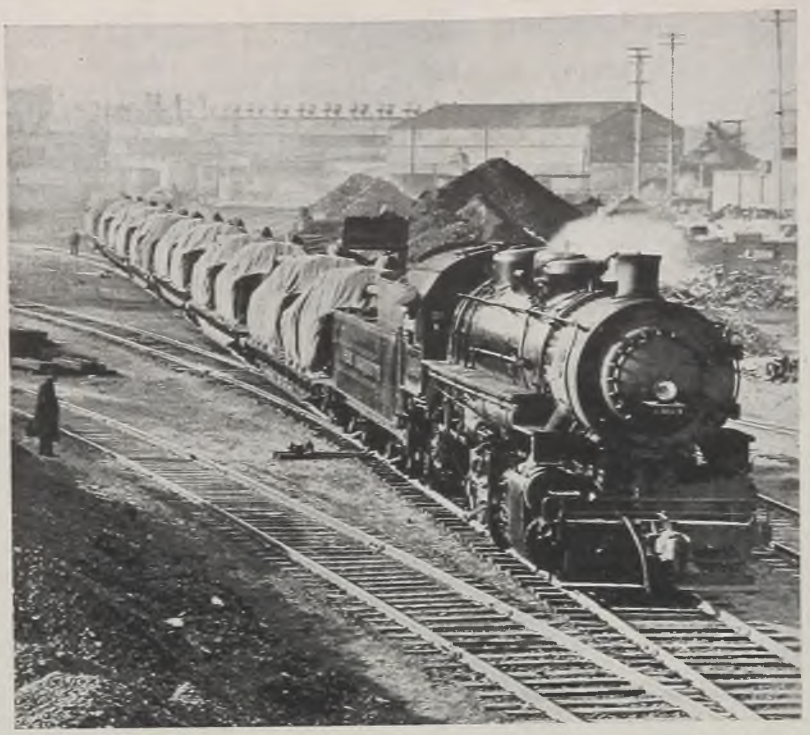
Observers are reading into the recent resignations of two key GM executives their possible early association with the new Fisher manufacturing enterprise. They are D. S. Harder of the top Fisher Body administrative staff, and H. F. Howard, for a number of years in charge of all Chevrolet-Flint operations. Both are typical fast-moving and hard-hitting auto executives, far from the age where they might want to retire to the California beaches, and although their future plans have not been announced, every reason exists for believing they must have made some commitments.

The spotlight was turned on specific reconversion of the automotive industry for the benefit of out-of-town newsmen who spent a couple of days here recently as guests of the Automotive Council for War Production. One of their first stops was at the Packard plant which is faced with a particularly tough problem since virtually every square foot of the 100-acre plant until the past few weeks has been completely occupied with machinery and equipment for production of military engines. Now at least a start has been made toward releasing something over 1,000,000 square feet for production of service parts.

Originally the Packard plant was to produce 800 Rolls-Royce engines a month. Even before this goal was reached, schedules were increased to 1400 a month, and then again to over three times the original level or to 2700 a month. Just in the past few weeks, a change in battle tactics by pilots of the Rolls-Royce powered Mustang fighter plane brought requests for another boost of 160 engines a month. Reports were that pilots were using the Mustang for ground-strafing with wide-open or emergency supercharging giving speed of something better than 500 miles an hour, sharply reducing life of the engine between overhauls.

To return this vast production facility to automotive production is a very practical problem, one phase being the disposition of 9000 machine tools. Take the matter of merely moving them out of the plant. If a crew of five men could dispose of four machines daily, then it would take this gang just 2250 days or

BULLDOZER: Caterpillar diesel tractor with LaPlant-Choate bulldozer knocks down an erosion wall along the mountain road between San Pietro and San Vittore to allow two-way traffic to and from the front in Italy. Signal Corps photo



HIDDEN FROM CURIOUS: Shrouded for secrecy more than for protection against weather, M-18 tank destroyers by the trainloads leave the Buick plant at Flint, Mich. Developed and manufactured by Buick in co-operation with Army Ordnance and Tank Destroyer Command, the M-18 has been in volume production for more than a year

over six years just to clear the plant. Add to this the fact that many another motor plant may be up against its machine tool moving problems at about the same time, and it is easy to see moving day in Detroit is going to be something terrific; and the "moving day" is some distance from resuming car production. In prewar automotive production Packard used 3906 machine tools, of these, 2003 are now converted to war work and the balance are stored outside awaiting re-installation. Out of the 7000 government-owned machines in the plant, less than 1500 are considered adaptable to eventual automotive work.

At a press conference with visiting writers, a panel of ten top motor executives laid the cards on the table concerning their immediate problems. As a clear-cut exposition of some concrete difficulties, the conference was not too successful from the industry's standpoint, for there was apparent some divergence of opinion between the participants, which is only natural considering the highly competitive nature of the business. K. T. Keller, Chrysler president, for example, believed there was too much emphasis being placed on the entire subject of reconversion. He said no one, either in government or out, could foretell exactly when the European phase of the war would end, much less diagram a finish to the Japanese struggle. Thus there may be new and unforeseen requirements for military production from day to day which could knock all reconversion planning into a cocked hat. Just in recent weeks, for example, Chrysler has had a 30 per cent increase in Bofors gun schedules, requiring additional tooling for six plants participating in this job. More than 1,000,000 square feet in Chrysler plants is busy on Bofors work.

Mr. Keller Cites Figures

To give an idea of the overall reconversion job facing Chrysler, Mr. Keller cited some figures. Complete reconversion to automotive production will require clearing 17,000,000 square feet of plant space, moving out $50,000,000 worth of production equipment, installing 1000 miles of new conveyor systems with incidental electrical equipment and piping, resetting and tooling of 24,000 machines, moving out and disposal of 100,000 tons of government material, overhauling of 1,000,000 jigs and fixtures, to say nothing of recasting the entire supervision of the plants involved.

Mr. Keller, in reviewing this staggering job, said that just one little question looming larger every day is where to obtain the machinery movers, erectors, electricians, plumbers, foundation builders, etc., to handle the work. He viewed the job as five times as great as the conversion to war production in 1942, particularly since the latter was spread out over an appreciable length of time.

Another significant point emphasized by the motor executives in connection with cutbacks was the mere trimming of a contract by 35 or 40 per cent would not release any floor space which might be transferred to automotive work. It would simply mean reducing the working force by one shift and lowering the amount of material being processed. This is an important point for Washington authorities to keep in mind in scheduling cutbacks. It is apparent they must be selective and not industry-wide if they are to dovetail efficiently with resuming civilian production. Thus it is entirely logical to remove all aircraft production from automotive plants before trimming schedules in other plants producing the same material, even though labor is temporarily displaced in Detroit, for by so doing, these plants can move at once toward reconversion and the rehiring of personnel.

Worries over unemployment in Detroit during reconversion are not justified, in the opinion of Mr. Keller who believes that no matter how protracted the switch-over, employment here will hold at a good level. Obviously there will be many now working who will return to their homes, since they are not normally considered employables.

C. E. Wilson of General Motors proposed that consideration be given in Washington to the granting of special priorities to automotive plants on "key" machine tools needed at once to fill out the initial production pattern. His suggestion was somewhat broader than this, covering similar assistance to all industries which, like automotive, have been practically 100 per cent converted to war production and which are faced with unusually difficult reconversion. However, J. A. Krug of WPB, when told of this suggestion, flatly turned it down as impossible due to what he called "steadily mounting munitions schedules."

General Motors requires 23,000 new machine tools for its complete postwar production plan, and 3600 of these are needed immediately to establish production on a level of 50 per cent of the 1941 level. So far, of the machine tool orders placed by GM, only 17 per cent have been promised for delivery by Jan. 1, others extending all the way to June, 1945, and still others receiving no delivery promises.

C. W. Davis of Davis Tool & Engineering Co., speaking at the conference for suppliers of automotive tools and dies, said important work might be done now in replacing worn and lost 1942 dies in motor plants, except that government restrictions prevent it. He indicated capacity and manpower were available from time to time, particularly in the smaller shops, which might be profitably devoted to this make-ready work.

C. C. Carlton of Motor Wheel Corp., reported parts manufacturers were being stymied behind government restrictions and the nation's reservoir of private transportation is seriously endangered by lack of replacement parts. He urged immediate steps toward removal of restrictions on manufacture and distribution of all automotive parts.

"Visual control board" system helps speed contract terminations at Wright Aeronautical Corp.'s warplane engine plant at Cincinnati. New method reportedly is approximately four times as fast as other systems

NECESSITY of speeding contract termination has been met in a unique method by Wright Aeronautical Corp. at its Cincinnati warplane engine plant by installation of a "visual cotrol board" system for scheduling dates and steps in reconversion and eliminating the former method of "ledger" control.

The company states that large scale conversion of war contracts has speeded up its terminations in a fraction of the usual time. In two instances involving recent terminations or conversions, the Wright plant has predetermined schedules for $128 million and $50 million terminations in the unprecedentedly short time of 105 and 90 days respectively.

The new visual control method, known as Produc-Trol, was reported by the company to be "approximately four times as fast" as other methods. One large company recently reported handling a $217 million termination within a period of two years in contrast with the 150-day schedule compiled by Wright.

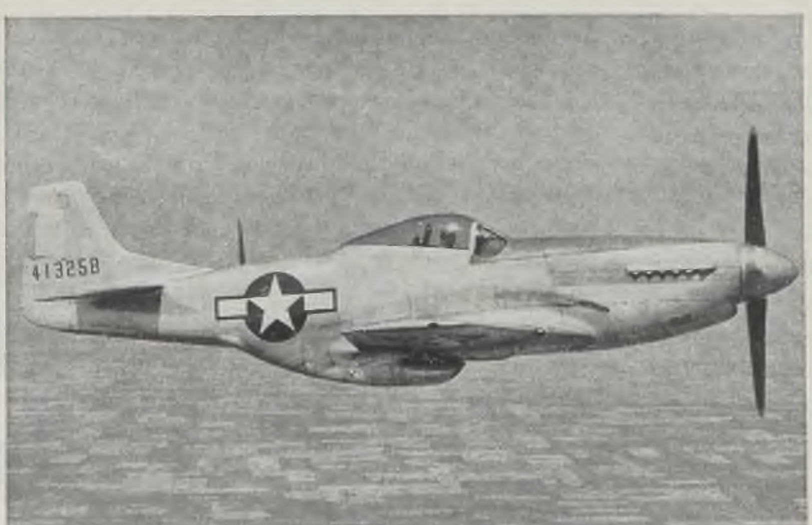
The secret of the system lies in the use of visual control boards of the kind widely employed in scheduling production. The system still includes the regular procedures of handling nearly 1000 vendors and about 15,000 purchase orders at one time. Its speed and efficiency, however, rests in the method of scheduling the various steps involved in a termination, keeping track of the progress made from day to day and giving an overall picture at any given moment.

By the former method of employing forms and ledgers the handling of vendors was a critical constantly changing problem failing mainly in giving a clear overall picture. While revisions were posted in the ledgers changes in the status of dealings with half a dozen vendors might take place so that the revised posting was obsolete even before finished. Constant rechecking and possible overlooking of some vendors was the inevitable result of the former method, it was claimed.

When a contract termination notice is received, a schedule is established after conferences with officials of the affected departments. It indicated the date when each of seven major steps of the termination procedure should be completed. Each operation is represented on the control boards by a different colored vertical line, the lines superimposed on the exact date when the operation is scheduled for completion.

Each horizontal line represents a canceled purchase order resulting from the termination and progress through each step of the procedure is plotted as the action takes place. Postings are made by inserting a peg of the same color as the corresponding vertical line on the actual date when the operation was accomplished. The white horizontal, progress line is then extended to meet the colored vertical line representing that step in the procedure.

Outstanding vertical line on the board is the current date line which is moved one space toward the final goal each day. As it approaches the vertical schedule line it is possible to plan the next action. As the date line meets the various schedule lines it can be seen at a glance, by comparison with the horizontal progress lines, exactly which vendor cancellations run behind schedule. Effort is directed toward keeping the progress lines up to, or ahead, of the moving date line at all times.



BUBBLE CANOPY: New bubble canopy on the North American P-51 Mustang materially aids fighter pilots in gaining advantage over the enemy through improved vision. This canopy is unexcelled by any in the world, according to Air Technical Service Command experts, who developed it by improving upon German and British models

"Sky Hook" Latest AAF Aerial Delivery Idea

The sky hook, long in the realm of striped paint and left-handed monkey wrenches, has at last become a reality! Currently under test by the miscellaneous equipment branch of the Air Technical Service Command's personal equipment laboratory at Wright Field, O., the sky hook is actually a rotary wing container for emergency supplies, cleverly adapted in shape for a method of descent similar to a falling maple seed.

Battlefront reports to the AAF of difficulties in accurate parachute delivery of emergency supplies from low altitudes, fostered development of the sky hook. Parachutes, subject to wind drift, are inaccurate from safe heights. A device which would provide accurate aerial delivery from high altitudes was required—and Yankee ingenuity, plus the maple seed, may provide the solution.

Approximately 65 pounds of food, medicines and other emergency supplies may be packed in the bulbous plastic container, roughly 8 inches deep and 20 inches in diameter, which is the counterpart of the maple pod. The wing or blade of the sky hook, approximately 1 foot wide and 3 feet long, is a flat wooden frame covered by airplane cloth.

Released from a plane in a flat position, the sky hook spirals to the earth in a flat spin around its own center of gravity at an approximate speed of 35 feet per second—slightly faster than a parachute. Drift is negligible and accuracy correspondingly greater.

The sky hook's major wartime use may be as an emergency supply kit for units isolated in combat. Postwar uses may include its employment as a device for aerial delivery of mail.

Photo Template Process Aids B-29 Construction

Man-hours are saved, accuracy is assured and many more Superfortresses can be manufactured as a result of the photo template process used by the Boeing Aircraft Co.

Less than a decade ago it would have required as much as a hundred man-hours to reproduce a single template for the B-29. Now these templates are re-

Which is Better?

And a SPEED NUT is a self-locking nut, too, that weighs less, stops vibration loosening and cuts assembly costs 40-50% . . .

The SPEED NUT method requires only 3 hand operations as shown in photos above. And only 2 parts are needed instead of 3. Why go through 5 hand operations when only 3 are necessary? Why handle 3 parts when only 2 are required? For an eye opener on the economies of the SPEED NUT system just multiply this 40% motion-saving by the millions of fasteners you use per month. Then add to that the saving by eliminating 1/3 of the parts. Your figures will amaze you. The winning products in postwar competition will be those that are assembled faster and protected against loosening from vibration. Billions of SPEED NUTS were used before the war and on war products, too. More billions will be used on postwar products. Over 2,000 shapes and sizes. Engineers who move up faster are those who know how to make assembly lines move faster. Write for literature.

TINNERMAN PRODUCTS, INC.
2039 FULTON ROAD, CLEVELAND 13, OHIO
In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London

F A S T E S T   T H I N G S   I N   F A S T E N I N G S

SEE OUR DISPLAY AT THE NATIONAL METAL CONGRESS, SPACE No. I-617

Speed Nuts*
[PATENTED]

*Trademark Reg. U. S. Patent Office

produced in a few minutes by putting "photographs" of the designs on special coated steel sheets.

When Boeing moved into mass production of the huge planes, it was vital that all parts made by hundreds of subcontractors be accurate and easily interchangeable. The photo template process solved the problem, and provided fast, photo-exact reproductions of all the patterns.

The process takes a picture of a template drawn full size on a steel sheet painted pale green. Boeing uses Armco sheets with a special mill-bonderized coating that grips and holds paint.

When draftsmen complete the master template, it is set on an easel and held in place by suction applied through holes in the easel-back. From an adjoining room, the six ton camera takes a picture of the pattern through an aperture in the intervening wall. The negative, reduced to one-fifth size, is made on a glass plate to prevent shrinkage. Tolerances of no more than one-thousandth of an inch a foot are permitted.

For reproductions, lacquered steel sheets are prepared for processing on an assembly line basis. In a photographic dark room they are sprayed with a photographic emulsion. The prepared "positive" sheets are dried for one hour, then stored in racks ready for use.

When ready for exposure the sheet is placed on the camera easel in the dark room and the camera is properly adjusted. The negative glass plate is placed in the camera and "shot" through the lens, projecting the pattern details on the sheet.

After exposure a regular photographic laboratory process is used. The sheet is developed, rinsed, fixed, and washed exactly in the same manner as small snapshots. When washing is completed, the sheet is dried and is ready for shop use.

In most cases the sheets are made to the actual size of the B-29 parts they represent. The templates serve as jigs and fixtures, patterns for router and drill operators, and are used in producing various types of dies for the Boeing B-29 Superfortress.

Army Discloses New Weapons Now in Action

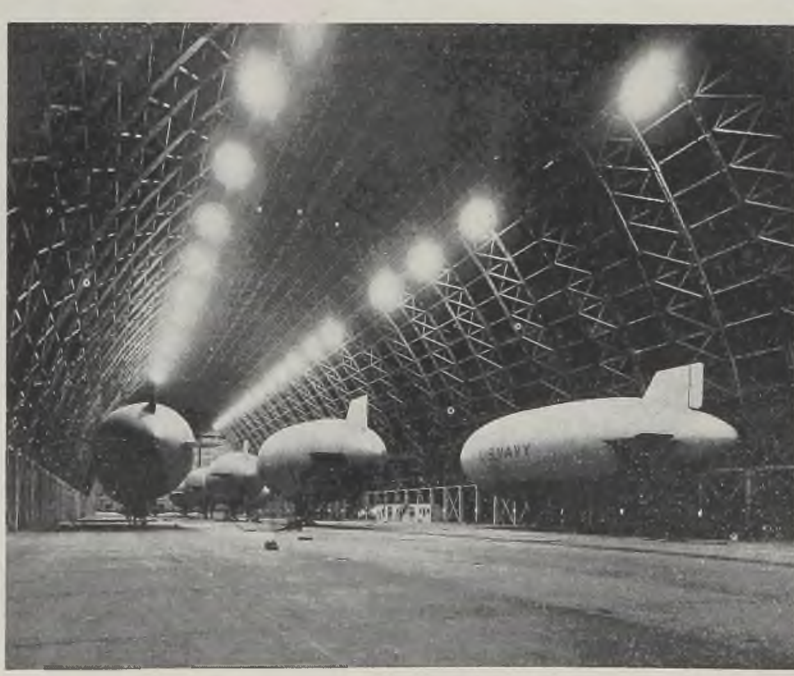
Among recent ordnance developments now in use in various theaters of war, according to the latest *Army Ordnance Bulletin*, is the 100-pound spike bomb. In the bombing out of Japanese-held railroads and bridges in Burma, U. S. flyers found 100-pound bombs with delay-action fuzes had a tendency to riccochet and explode harmlessly several feet away. Delay-action fuzes were necessary to allow low-flying aircraft to get away from the blast. The problem was overcome by removing the bomb noze fuze (leaving the tail fuze intact) and putting in its place a spike made from an old axle with one end threaded to screw into the bomb and the other end of the spike sharpened to a point.

Several of these spike bombs were improvised at the front and dropped. They stuck and the targets were destroyed. Ordnance field men continue to produce them by hand until the production order could be shipped from th country.

Another new weapon in the Pacif theater of war is a light-weight jung mortar, designated the T18E6. It is 60-millimeter unit which can be carrie by one man, together with a limite amount of ammunition. It is fired by trigger-and-lanyard arrangement and ca be used at angles of elevation outsic the limits of the standard 60-mill meter mortar.

A development instituted by Arn Engineers, with Ordnance acting as co sultant on the use of armor plate ar providing test facilities, is the armor cab for bulldozer tractors, now ava able in four sizes. Half-inch plate used on all four sides and top, protec ing tractor operators from small arr and machine gun fire, land mines, han grenades and bomb and shell fragment The cabs are shipped knockdown an assembled in the field.

General Eisenhower in a recent repo has cited impressive data on consum tion of ordnance and other war materi in the first 70 days of the Europea invasion, or until about Aug. 15. Mo than 900 tanks were required to replac battle casualties; 2400 automatic rifle 1750 quarter-ton trucks, 1500 mortar also 150,000 tons of ammunition p month, including 40,000,000 rounds .30 caliber, 800,000 rounds of morta and 900,000 rounds of 105-millimete



HOME TO ROOST: These Navy training blimps, the day's training flights over, have been returned to their new modern hangars at Moffett Field, Calif. The hangar shown is 1000 feet long, 300 feet wide and 175 feet high

Plane Plant at DeKalb, Ill., To Close in October

Production of airplanes at Interstat Aircraft Corp. at DeKalb, Ill., will b discontinued in October, the Navy Bu reau of Aeronautics announced recentl

A certain number of planes now o the assembly line will be completed bu additional units scheduled will be can celed because of a reduction in require ments by the Navy. Interstate Aircra Corp. is in a No. 1 labor area an there are numerous other war plants i the immediate vicinity offering prospect for jobs for workers affected, accordin to the War Manpower Commission.

Approximately 200 employes will b released immediately and the other 35 on the payroll will be given notice i October. Classification of these workers and their referral to other war jobs wil be handled by the United States Employment Service.

Two major subcontractors are involved. One is the Wurlitzer plant, also located at DeKalb, where the 200 to 250 employes engaged in making wing panels and empennage can probably be assigned to other aircraft work in the same plant to a considerable degree. The other is the General American Aero Coach Co., Chicago, which may be expected to reduce its 400 workers now producing the fuselage and inner wing panels.

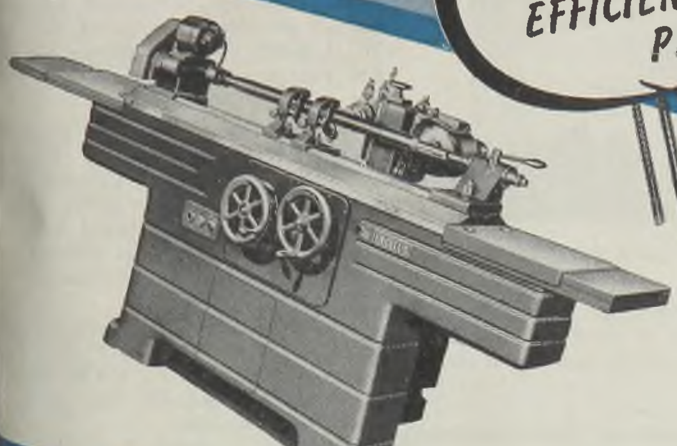
Now ... EX-CELL-O BROACH SHARPENING MACHINE

AVAILABLE IN 4 STYLES FOR MOST EFFICIENT PRODUCTION

FOUR STYLES EX-CELL-O BROACH SHARPENING MACHINES

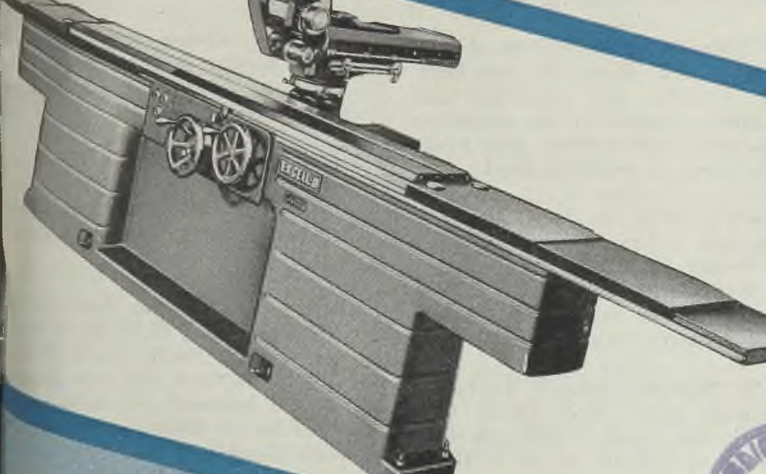
No. 80 Small Machine for Round Broaches
No. 80-L Large Machine for Round Broaches
No. 81 Small Machine for Flat Broaches
No. 81-L Large Machine for Flat Broaches

For further information, write to Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit 6, Mich., and ask for specifications on new Ex-Cell-O Broach Sharpening Machines.



EX-CELL-O—STYLE 80

For economical sharpening of round broache... Has heavy base and sturdy, well-supported tab... EX-CELL-O precision ball bearing spindle assur... freedom from vibration, maximum service li... and a good grinding finish. V-belts and 3-st... pulleys allow a practical range of work spee... Push button controls are on front of the machi...



EX-CELL-O—STYLE 81-L

For sharpening flat broaches and grinding strai... slots, keyways, and grooves to close toleranc... The cross travel of the spindle is manually operat... Adjustable stops are provided so that spin... travel in either direction can be accurately limi... when necessary. Ex-Cell-O broach sharpen... machines have been in use in Ex-Cell-O pla...

MANY years of experience in the production of broaches, broaching fixtures, and precision machine tools form the background for the design and manufacture of Ex-Cell-O broach sharpening machines. Each machine is built to give the utmost in speed, accuracy, and economical production. Each combines simplicity and ruggedness in construction, with modern streamlined appearance. These new Ex-Cell-O broach sharpening machines are special purpose machines. They are ideal for large production set-ups, and are advantageous also for occasional work. By the use of Ex-Cell-O broach sharpening machines, set-up time is highly minimized, the hazard in changing equipment is practically eliminated.

1919 · TWENTY FIVE YEARS · XLO · OF SERVICE · 1944

EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • BROACHES AND BROACH GRINDING MACHINES • HYDRAULIC POWER UNITS • GRINDING SPINDLES • DRILL JIG BUSHINGS • CONTINENTAL CUTTING TOOLS • TOOL GRINDERS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PAPER MILK BOTTLE MACHINES • PRECISION AIRCRAFT AND MISCELLANEOUS PARTS

MEN of INDUSTRY

FRED GROTTS

LEOPOLD H. P. KLOTZ

Fred Grotts has been appointed director of research and metallurgy for all plants of H. K. Porter Co. Inc., Pittsburgh. Mr. Grotts continues as president of the company's subsidiary, Ft. Pitt Steel Casting Co.

—o—

Leopold H. P. Klotz has been elected a director, vice president and treasurer, Luscombe Airplane Corp., Trenton, N. J.

—o—

David H. Comtois has been appointed manager of standard products for Corbin Screw Corp., New Britain, Conn., succeeding **William M. Caudell Jr.**, who has resigned to become assistant sales manager, Refrigerator division, Portable Elevator Mfg. Co., Bloomington, Ill.

—o—

W. A. Meyer has been appointed manager of dealer sales, Allis Chalmers Mfg. Co., Milwaukee, succeeding **S. H. Gorham**, resigned.

—o—

James R. Travis has been appointed chief tool engineer for Harnischfeger Corp., Milwaukee. Previously Mr. Travis had been associated with Sperry Gyroscope Co. Inc., Brooklyn, N. Y.

—o—

Fred A. Hanlin, executive vice president, Weirton Steel Co., Weirton, W. Va., has been reappointed an industry member of the Fifth Regional War Labor Board for the coming year.

—o—

Charles P. Whitehead has been elected a director of General Steel Castings Corp., Eddystone, Pa. Mr. Whitehead, a vice president since May, 1938, has been with the corporation and its predecessor 25 years.

—o—

A. A. Kucher, director of research of Bendix Aviation Corp., South Bend, Ind., and chairman of its long-range planning committee, has been elected a vice president.

—o—

Walter H. Wheeler Jr., president, Pitney-Bowes Postage Meter Co., Stamford, Conn., has resigned as New England regional director, War Production Board, Boston, to return to his duties as head of that company. **Walker Mason,** former president of the Semi-Steel Castings Co., St. Louis, becomes WPB director in Boston.

—o—

Paul F. Schucker has been appointed to the executive staff of Charles A. Koons & Co., New York exporters. Mr. Schucker, who for the past three years has been chief of the Export Steel Branch, War Production Board, will be in charge of the export department.

—o—

J. P. Johnson, vice president of Aro Equipment Corp., Bryan, O., has been elected executive vice president, and **J. E. Allen**, assistant to the president, was elected vice president. Mr. Johnson is in charge of Aro's Cleveland plant.

—o—

Edward J. Head has been appointed sales manager in New York for Universal Atlas Cement Co., New York, United States Steel Corp. subsidiary, and **Foster A. Hagan** has been named assistant sales manager, New York.

—o—

H. M. Benham, formerly associated with United States Steel Export Co., New York, has joined A. Milne & Co., New York, as assistant to **H. S. Hoyt,** senior partner.

—o—

Gale H. Fegley has retired after 26 years of service with Shunk Mfg. Co., Bucyrus, O., as sales manager. Mr. Fegley has no immediate plans for the future.

—o—

R. E. Gillmor, president of Sperry Gyroscope Co. Inc., Brooklyn, N. Y., has been elected a vice president of Sperry Corp., New York, parent company. **Harry F. Vickers**, president of Vickers Inc., Detroit, another Sperry Corp. subsidiary, also has been elected a vice president of the parent organization.

—o—

W. S. Milton has been appointed sales manager of the newly set-up Southwestern division of Hudson Motor Car Co., Detroit. Headquarters of the new sales division will be in St. Louis. **Neil C. Cunningham** succeeds Mr. Milton as St. Louis zone manager. Other Hudson appointments are: **C. A. J. Hadley**, sales manager, Northwest division, Chicago; **G. A. Schacht**, zone manager, Milwaukee, and **C. C. McKellar**, manager of parts and accessory merchandising.

—o—

C. V. Pattison, son of the late W. M. Pattison, one of the founders of the Pattison Supply Co., Cleveland, has been elected president, succeeding the late W. H. Smith. **A. B. Rathbone** becomes first vice president.

—o—

D. J. Ambrose has been appointed district sales manager of the Houston, Tex., office of Jones & Laughlin Steel Corp., Pittsburgh, succeeding **Frank Winslow**, resigned. **Howard Knobloch** succeeds Mr. Ambrose as assistant district sales manager in Cincinnati.

—o—

Norbert Schroeder, previously associated with Hamilton Mfg. Co., Two Rivers, Wis., has joined McCray Refrigerator Co., Kendallville, Ind., as assistant factory manager.

—o—

Forest W. King has been appointed master mechanic, Warren City Mfg. Co., Warren, O. Formerly Mr. King had been master mechanic at Willys-Overland Motors Inc., Toledo, O.

—o—

Glenn W. Shetler, former general manager, Barium Steel Corp., Canton, O., has been appointed vice president in charge of operations.

—o—

Edgar J. Hammond Jr., former assistant director, WPB Copper Division, has been appointed manager of sales and of field engineering, Western Insulated Wire Inc., Los Angeles.

—o—

Thomas N. Johnson, formerly engaged in advertising and business development work for Pacific Gas & Electric Co. in San Francisco, has been appointed regional business consultant in San Francisco for the Bureau of Foreign and Domestic Commerce.

—o—

T. L. Knecht has been appointed vice president and general manager, Borg & Beck, a Chicago division of Borg Warner Corp. **J. T. Branit** succeeds Mr. Knecht as factory manager of the division.

—o—

American Foundrymen's Associati[on] has established a technical developmen[t] program under the guidance of **N. F. Hindle,** director of the new progra[m] and **R. E. Kennedy,** secretary of th[e] association. Working with these m[en] will be the following advisory co[m]mittee: **S. V. Wood,** chairman, w[ho] is president and manager, Minn[e]apolis Electric Steel Castings Co., Mi[n]neapolis; **Max Kuniansky,** vice preside[nt] and general manager, Lynchburg Fou[n]dry Co., Lynchburg, Va.; **Walton Woody,** vice president in charge of o[p]erations, National Malleable & St[eel] Castings Co., Cleveland; **Dr. D. Bas** consultant, General Electric Co., Schenectady, N. Y.; **Hyman Bornstein**, director of laboratories, Deere & Co., Moline, Ill.; **George K. Dreher**, vice president in charge of manufacturing, Ampco Metal Inc., Milwaukee; **C. J. Freund**, dean of engineering, University of Detroit; **James H. Lansing**, consulting engineer, Malleable Founders' Society, Cleveland; **F. A. Melmoth**, vice president in charge of operations, Detroit Steel Casting Co., Detroit, and **H. S. Simpson**, board chairman, National Engineering Co., Chicago.

—o—

F. E. Schaumburg, since 1932 roadmaster for Chicago & Northwestern railway, has resigned to join Caterpillar Tractor Co., Peoria, Ill., as railroad representative, Sales Development division.

—o—

J. P. Wear Jr. has been appointed Philadelphia district merchandising manager, Graybar Electric Co. Inc., New York.

—o—

William A. Mara, former director of personal airplane sales and service for Consolidated Vultee Aircraft Corp., San Diego, Calif., has joined Bendix Aviation Corp., South Bend, Ind., as a staff executive. Mr. Mara's primary responsibility will be supervision and co-ordination of various Bendix product developments relating to the personal airplane.

—o—

Thomas E. Galligan, formerly general superintendent, Hudson Motor Car Co., Gratiot Body plant, has been appointed general plant manager, Cole Steel Equipment Co., New York.

—o—

William B. Meek has been appointed manager of a new branch office of Westinghouse Electric Supply Co. in New Orleans.

—o—

Frank R. Kettering, supervisor of graduate student activities, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has received his company's Order of Merit. Mr. Kettering's son, W. L. Kettering, headquarters industrial relations supervisor of group insurance and annuities, already holds this award, and thus the two men become the first father and son to receive the award.

—o—

E. N. Searles has been appointed general installation engineer, Western Electric Co., New York, succeeding **F. M. Williams**, who has retired after 35 years of service with the company.

—o—

Lloyd C. Smith has been made assistant domestic sales manager, Heller Bros. Co., Newark, N. J. Before joining the Heller company early this year Mr. Smith was sales representative for Nicholson File Co., Providence, R. I.

—o—

M. K. Hovey has been appointed general plant manager of Chevrolet Motor division plants in Flint, Mich., succeeding **H. F. Howard**, resigned. Since August, 1941, Mr. Hovey has been chief inspector of the Pratt & Whitney aviation engine project, a major Chevrolet war production assignment. Mr. Howard had been associated with Chevrolet since 1930.

—o—

Willard Simon has been appointed assistant district sales manager of the Cincinnati office of Republic Steel Corp., Cleveland. Major Simon was released last month from the Production Division Hdq. Army Service Forces. Prior to entering the service in 1942, he was connected with Republic's Washington office.

—o—

Irwin Miller, who has served with the U. S. Navy for the past two years, has been released and assumes the duties of executive vice president of Cummins Engine Co., Columbus, O. Prior to his service in the Navy Mr. Miller was general manager of the company.

—o—

George P. Nelson has returned as director of engineering for **L. A. Young** Spring & Wire Corp., Detroit, after two years as factory manager for Precision Spring Co., Detroit.

—o—

Robert R. Cole, vice president, Monsanto Chemical Co., St. Louis, and general manager of the Phosphate division, has been elected a director, filling the vacancy on the board caused by the recent death of John C. Brooks.

—o—

John Morrow Jr. has been re-elected a vice president of International Harvester Co., Chicago, after serving for more than two years as a colonel in the United States Army overseas. Mr. Morrow will supervise the company's purchasing and traffic departments.

—o—

S. M. Cassidy has been appointed vice president of Weirton Coal Co., Weirton, W. Va.

—o—

C. W. Schemm has joined Ajax Electric Co., Philadelphia, as sales engineer in northern California, with headquarters in San Francisco. For a number of years he was an industrial heating specialist for General Electric Co. in the St. Louis area.

—o—

Charles A. Simmons Jr., vice president of Simmons Machine Tool Corp., Albany, N. Y., has been appointed chairman of an industrial committee which will survey present and postwar employment possibilities in Albany, N. Y., industries. Appointment was made by **Norton McKean**, Albany chairman, Committee for Economic Development.

—o—

Firth-Sterling Steel Co., McKeesport, Pa., has announced the following appointments: Chief metallurgical and sales engineer, Steel division, **J. P. Larkin**; assistant manager, Firthite division, **Andrew H. Godfrey**; assistant manager, Firthaloy division, **Anthony J. Allen**; Ohio district sales manager, **Thomas W. Gabriel**, and Pittsburgh district sales manager, **Lloyd W. Clowes**.

—o—

Lt. Col. Jefferson S. Gamble has returned to the Wallace Barnes Co., division of Associated Spring Corp., Bristol, Conn., after having served a year with the War Production Board and two years with the Transportation Corps, United States Army.

THOMAS W. GABRIEL

ANDREW H. GODFREY

ANTHONY J. ALLEN

LLOYD W. CLOWES

J. P. LARKIN

JAMES L. DUNN

Who has been elected vice president in charge of industrial relations, Jenkins Bros., New York, noted in STEEL, Oct. 2, p. 57.

JAMES B. BLACK

Who has been elected a director of United States Steel Corp., Pittsburgh, as announced in STEEL, Oct. 2, p. 57.

WM. W. KNIGHT JR.

Who has joined the Rolling Mill division, Morgan Construction, Co., Worcester, Mass., noted in STEEL, Sept. 11, p. 92.

OBITUARIES

Frederic Ely Williamson, 68, president of the New York Central system from Jan. 1, 1912, until he resigned a month ago because of ill health, died Sept. 29 in New York. He was serving the railroad as an advisory executive at the time of his death.

—o—

Albert G. Mason, 73, former utility executive and retired president of R. Thomas & Sons Co., Lisbon, O., died there Sept. 26.

—o—

Cornelius B. Dorgan, 58, factory manager, Cleveland Welding Co., Cleveland. died there Sept. 30.

—o—

Edward P. Byrnes, 71, chairman and founder, Boye Needle Co., Chicago, died Sept. 28 in Evanston, Ill.

—o—

Edgar N. Yost, 57, division superintendent, Gary armor plate plant, Carnegie-Illinois Steel Corp. since July 1, 1942, and prior to that chief of the Gary steelworks inspection department, died recently in Chesterton, Ind.

—o—

Earl L. Myers, 52, general superintendent of Gisholt Machine Co., Madison, Wis., died there Sept. 20. Prior to 1928 Mr. Myers had been associated with LeBlond Machine Tool Co., Cincinnati.

—o—

William A. Baker, 51, special representative in the general sales department of Hudson Motor Car Co., Detroit, died Sept. 21 in Grosse Pointe Farms, Mich. Before Pearl Harbor Mr. Baker had been national used car manager for Hudson.

—o—

Frank B. Plesko, 76, who organized Acme Tool Co., Cleveland, and was active in its affairs until his retirement in 1931, died Sept. 27 in Wickliffe, O. Mr. Plesko was widely known for his invention of a frog for retracking trains which had been derailed.

James Thompson, 79, owner of extensive structural steel interests, and responsible for erection of the steel work in many of Buffalo's largest buildings, died in that city Sept. 27.

—o—

Carl M. Yoder, 59, president of the Yoder Co., Cleveland, died Sept. 28 in Lakewood, O. In 1910 Mr. Yoder developed, perfected and built the first machine for the cold rolling and bending of steel.

—o—

George G. Bach, 46, production manager, Stolper Steel Products Corp., Milwaukee, died Sept. 17. He had been employed by the company 25 years.

—o—

P. E. Herman, 75, retired salesman of the Organic division, Monsanto Chemical Co., St. Louis, died Sept. 23 in Cincinnati.

—o—

W. Searls Rose, general sales manager, W. L. Brubaker & Bros., New York, manufacturer of taps and dies, died Sept. 29 in that city.

—o—

William Deats, 74, research engineer, Graphite Metallizing Corp., Yonkers, N. Y., died Sept. 30 in Katonah, N. Y. In 1913 Mr. Deats had invented a pressure process for metallizing graphite with molten metal. He had retired in 1928, but two years ago he joined the Graphite Metallizing Corp. to supervise his process, which is now applied to brushes and electrical contacts for airplanes.

—o—

Ray A. Hauserman, 54, executive vice president, E. F. Hauserman Co., Cleveland, died there Oct. 1. Mr. Hauserman had been an officer of the company for the past 20 years and until a recent siege of pneumonia had been in charge of all plant operations.

—o—

Warren Carter, president of the Carter, Donlevy Co., Philadelphia, died recently in that city. Mr. Carter had been particularly interestetd in promoting the use of metal roofing.

—o—

Norman S. Braden, 75, director and former vice president, Canadian Westinghouse Co. Ltd., Hamilton, Ont., Canada, died Sept. 27 in Hamilton.

—o—

Olaf S. Pedersen, 69, believed to be the inventor of the copper-lined water heater, and vice president, Patterson & Kelley Mfg. Co., East Stroudsburg, Pa., died Sept. 26 in Orange, N. J.

—o—

William M. Bager, 65, former vice president, Bucyrus-Erie Co., South Milwaukee, Wis., died Sept. 27 in Pass Christian, Miss. After his resignation as vice president last fall, Mr. Bager was named the company's technical adviser.

—o—

Simeon Ray Tyler, 60, vice president in charge of purchases, Laclede Steel Co., St. Louis, died recently in Webster Groves, Mo.

—o—

William A. Gray Jr., secretary, vice president and purchasing agent of Crescent Brass & Pin Co., Detroit, died Sept. 23.

—o—

Mathew Johannes, 57, executive assistant of the Warren City Mfg. Co., Warren, O., former Maritime Commission executive, and former treasurer of the Warren City Tank & Boiler Co., Warren, O., died Sept. 25 in that city.

—o—

Charles A. Green, 58, West Coast agent for MacWhyte Co., Kenosha, Wis., died recently.

—o—

Harry J. Bostwick, 45, manager of postwar development for Chevrolet Motor division of General Motors Corp., Detroit, died Sept. 22 in that city.

—o—

Charles M. Emery, 65, sales manager, Pacific Piston Ring Co., Los Angeles, died there recently.

Loss of Turkish Ore Severely Jolts the Nazi War Machine

Without domestic resources of the mineral, Germany is dependent upon heavy imports for ordnance manufacture. Tonnage intake rose from 47,704 metric tons in 1933 to 176,406 tons in 1938

CUTTING off of shipments of Turkish chrome to Germany last spring was a severe jolt to the Nazi war machine, especially in view of Germany's loss of access to the Nikopol manganese deposits in the Ukraine, according to V. S. Swaminathan, well known writer on industrial and economic topics.

To maintain her iron and steel production at between 35 and 40 million short tons annually, Germany needs some 375,000 tons of manganese of which 125,000 tons were derived from areas in Europe up to recently accessible to her. With Germany proper accounting yearly for about 50,000 tons of manganese, obtained from manganiferous iron ore carrying 10 to 15 per cent manganese, Axis Europe is left with a deficit of over 200,000 tons. In 1938 the Third Reich was the second largest apparent consumer of both manganese and chrome.

Like manganese, chrome is largely consumed by the steel industry, but while the former is employed almost exclusively in the metallic form the latter is utilized in substantial amounts as chromite in furnace construction. Consumption of chromium has undergone considerable transformation since the last war. Then its application as a refractory material predominated, and only a small proportion was reduced to metallic form largely as ferrochrome for use in production of chromium and nickel-chromium steels and nickel-chromium iron alloys for heat resistant and electrical applications. But since development of the so-called stainless steels carrying about 13 per cent chromium, the use of the metal in alloy steel has risen markedly.

Chromite Output Expands Rapidly

Before 1915 world production of chromite averaged 150,000 metric tons while during 1916-18 and in 1920 it rose to an average figure of 260,000 tons. In 1929 it amounted to 635,000 tons. The recent rapid rate at which chromite output has been expanding is indicated by the fact that the estimated world production of the ore from the beginning to 1913 of 2,400,000 tons was surpassed in the twelve years 1913 to 1924, and was almost equalled in the two years 1936 and 1937.

With its metallurgical, chemical and refractory outlets chrome ranks next to manganese as regards tonnage consumed. Among the specifically military uses of chromium alloys may be cited armorplate, armor-piercing projectiles and stainless steels. Chromium cast irons are favored in high-grade castings from which oil refining, power plant and chemical industrial equipment and appliances are made. Gears, turbine castings and rotors, sheaves, brushings and heavy machine frames are made of the same material. As an electrical resistance material nothing is as good as nickel chromium alloys for use at high temperatures. Highly-stressed components of aircraft and automobiles are made of chrome-molybdenum steel.

Salts of chromium are employed for tanning leather, dyeing clothing in olive-drab color and other items of military equipment. In the refractory field, where chemical neutrality is desirable, chromite cements and bricks have no rival.

Germany has no domestic chrome, and Axis Europe as a whole is short of the metal. Her imports of the mineral rose from 47,700 metric tons in 1933 to 176,000 tons in 1938. Also she started purchasing more chrome from sources likely to be accessible, or neutral, in wartime, i.e., Yugoslavia, Greece and Turkey.

German's Chrome Imports
(in metric tons)

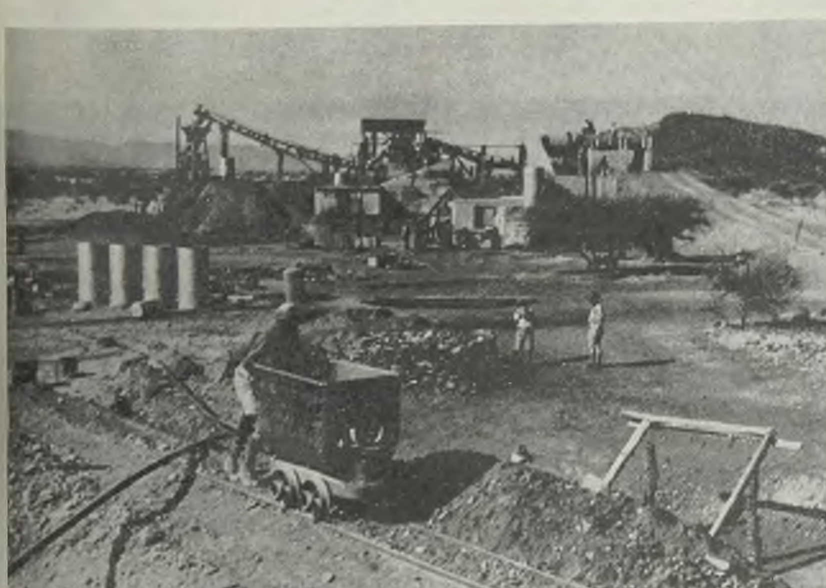
	1933	1938
Turkey	11,666	52,585
Greece	......	13,975
Yugoslavia	......	12,693
Total including other sources	47,704	176,406

Ordnance of all sorts is made in Germany from a steel containing one to 5 per cent chromium and smaller amounts of silicon and one or more of the so-called carbide-forming elements (tungsten, molybdenum, vanadium, etc.). Cast iron armorplate is forged of steel carrying 2 to 5 per cent chromium and minor quantities of nickel and molybdenum or tungsten.

Use Substitutes Where Possible

Where possible the Nazis substituted chrome-molybdenum steels for nickel-chrome varieties for aircraft and automobile construction, because they were uncertain of getting nickel from overseas and confident of importing molybdenum from Norway in an emergency. They did not bargain for the destruction of Norwegian Knaben mines and concentration plants in 1943. Lastly, one type of German high-speed tool steel has no tungsten at all, but has the subjoined composition: Chromium 1 to 6 per cent, carbon 1 to 1.6 per cent, molybdenum 1 to 5 per cent, and vanadium 2 to 6 per cent.

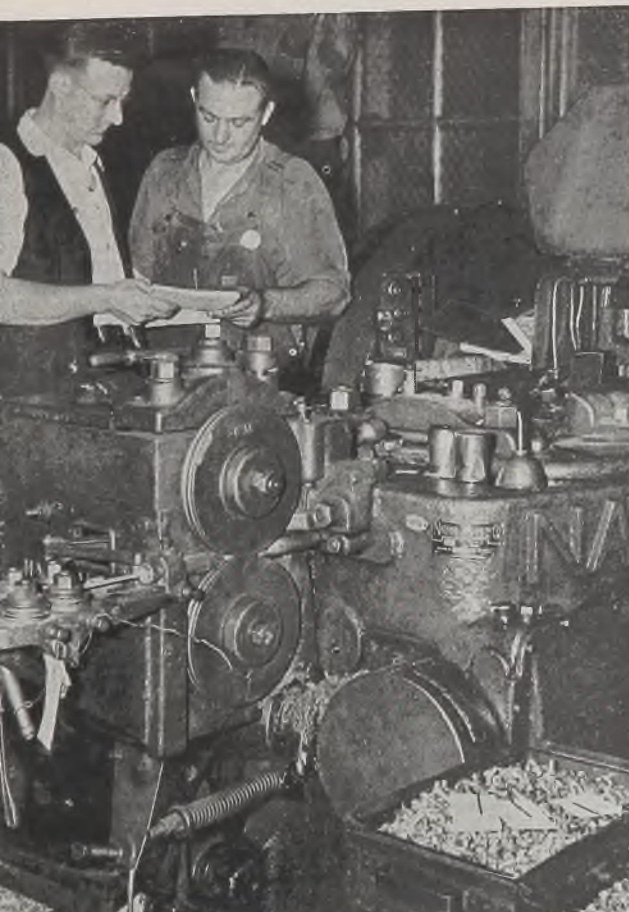
Last year Turkey shipped to the Reich 47,000 tons of chrome, and in the first two months of 1944 nearly 15,000 tons. The Yugoslav chrome deposits are found north, southwest and southeast of Skoplje. The harassing activities of Yugoslav patriots and Greek guerillas has rendered exploitation of chrome in Serbia and Thessaly an uncertain proposition. But now the Nazis are suffering from the loss of chrome imports.



Pictured is a chrome washing plant in Southern Rhodesia, which is one of the largest producers of chromite in the world. Photo, courtesy, British Information Service

Cleveland Plant's System Gives 25 Per Cent Increase in Output

Production costs lowered, man-hours saved, and over-runs and inventory losses reduced by method of National Screw & Mfg. Co. Customer relations improved through better deliveries



Foreman is halting production on one of the machines at the National Screw & Mfg. Co. in order to rush a special order of high priority bolts through the plant. Workman, right, receives the new order

Left, below, the woman is placing orders on the scheduling board according to their schedule date so it can be readily determined which orders to produce first. The schedule board is set up by group and by size of raw material in each group

THE GOVERNMENT'S demand for greater production of war materials for the United Nations' armed forces has made cost secondary to production during the past several years. But as the war draws nearer to a successful conclusion, industry is becoming more cost conscious in its postwar planning. For in the peacetime period the success or failure of a company will be dependent upon greater efficiency in producing products at or near prewar costs despite anticipated increases in labor and raw materials costs.

One company which already has overhauled its antiquated production control system and therefore should be in a favorable competitive position in the postwar period is the National Screw & Mfg. Co., Cleveland, manufacturer of such products as bolts, nuts, rivets, etc. Installation of the new system has resulted in a 25 per cent increase in production and a considerable reduction in per unit costs without any expansion of its facilities or any increase in the number of its workers.

The new system already has saved the company thousands of man-hours at a time when the labor shortage

By JOSEPH M. KURTZ
Assistant Editor, STEEL

reached critical proportions. And the government has been saved thousands of dollars on its contracts as a result of a reduction in production costs. The company began installing the new production control system shortly before Pearl Harbor. Today it is working at peak efficiency.

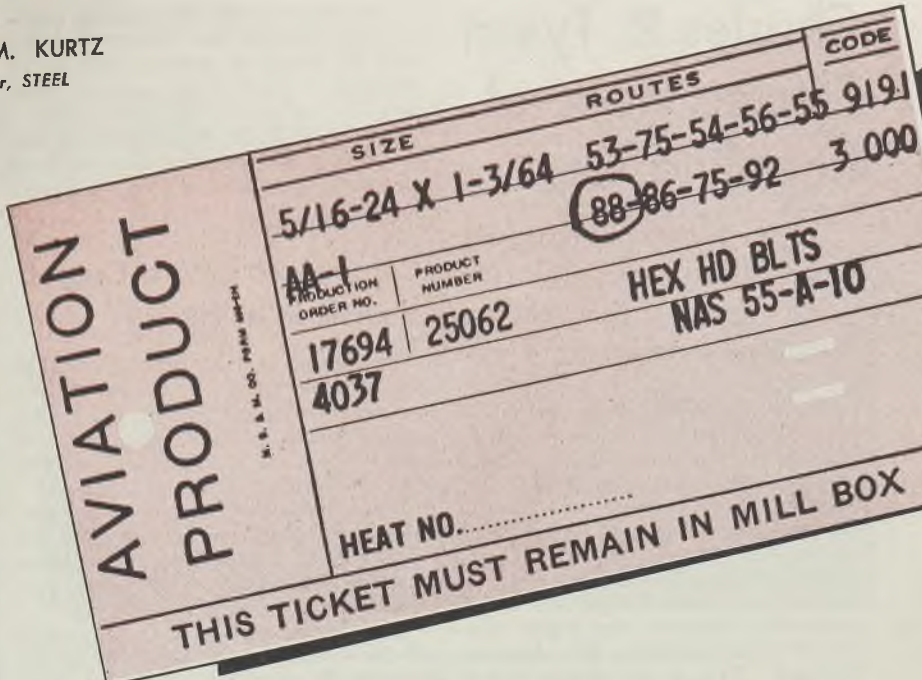
A production executive of the company who helped place the system in operation had this to say:

"The overall productive output has been increased by 25 per cent and has resulted in more satisfactory customer relations since we have been better able to meet customers' requirements. We have eliminated over-runs and resulting inventory losses and have been able to maintain more economical production runs. Formerly, production runs through the plant were split up into small runs. Now with an orderly arrangement and a perpetual inventory in the stockrooms, complete production runs are possible. In other words we are able to complete an order on one setup of the machines."

When an order is received by the sales department it is directed to the priorities division of the company where it must receive priority verification. Then the orders are registered and classed as regular or special.

A master card, set up alphabetically, is kept of all the companies National Screw does business with. On the order is placed the order number of the ordering company and whether it is a special or regular product. The order then goes to the order checker who decides into what division it will fall, whether automotive, electrical, aircraft, government (orders received directly from ordnance), and general. Reason for this is that the company must know the customer contact desk that the order must be assigned to. Each division within the National Screw has a customer desk. The customer desk does all the corresponding with customers for that particular division.

Formerly, this responsibility was split between the sales and production departments. Often correspondence was duplicated and contradictory statements were made.



This is what the National Screw & Mfg. Co. calls a travel ticket. This ticket is responsible for directing the work through subsequent operations since it is placed in the box with the material. Note, for example, that this ticket was made out for National Aircraft Standard bolts which will have to be directed through routes 53, 75, 54, etc., as shown on the upper right of the ticket

Variation in Handling Specials

The order checkers after deciding the customer contact desk to which an order must be assigned then selects the shipping room from which it will be dispatched. One shipper sends out specials, another bulk regulars, another packaged regulars, another all aircraft fasteners, and so on. There is a slight variation in handling specials.

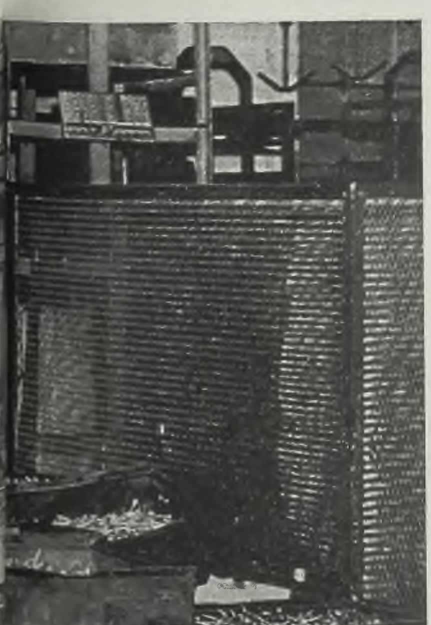
After all of these steps have been taken, the original order is sent to the order typist. She types up an order set, which is the authorization for the order division to place the order on the mill or ship from stock. That order set goes to the packer or shipper and is his authorization to ship the goods to the customer. A copy of the order is delivered to the order division desk and is filed into the customer's portfolio.

The order division before deciding to place an order in the shop or to ship from stock, checks the perpetual inventory record. If it is to be shipped from stock, the order division authorizes such shipment by so indicating on the order. If a shop order is necessary, the master routing card for the product required is removed from the file and given to the shop order typist who types out a shop order authorizing the manufacturing departments to proceed with production.

That shop order authorization is run off on a duplicator and copies are distributed to each of the departments in the routing. If the product is a rivet or pin the order authorizations would go only to one department, the cold header department. If the product is a close tolerance product for the aircraft industry like bolts which come under National Aircraft Standard, then the order authorization is distributed to about 20 departments because there are 20 operations involved in the manufacture of such a product.

Copies of the order which authorizes the originating department to proceed with production go first to the central scheduling division. Now the central scheduling division computes the amount

(*Please turn to Page* 332)



This worker, left, is taking an inventory of stock as it comes off the overhead conveyor from the header department in preparation for a secondary operation. Under the company's new production control system, before each operation on a bolt, nut, etc., is performed, an inventory is made of the stock

Charles R. Tyson Elected Head of Roebling Co.

Great grandson of founder succeeds to presidency. Firm, more than 100 years old, has supplied materials for 4 wars

CHARLES ROEBLING TYSON has been elected president, John A. Roebling's Sons Co., manufacturer of wire products, with plants in Trenton and Roebling, N. J. Mr. Tyson succeeds William A. Anderson, who died on Sept. 10 last.

Two years ago the Roebling company, now engaged almost 100 per cent in war production, observed the 100th anniversary of its founding by John Augustus Roebling. This is the fourth war in which the company has produced supplies and material for the nation's armed forces.

Election of Mr. Tyson places in the presidency the grandson of Charles G. Roebling, son of the founder, who became president of the company when he was 28 years old and served in that capacity from 1877 to 1918. Mr. Tyson, who attended Episcopal Academy, Overbrook, and Princeton University, was born in 1914.

Mr. Tyson, who lives in Philadelphia, became associated with the company in 1935 and worked in various manufacturing departments, including the open hearth and wire mills at Roebling. In 1940 he was made secretary and treasurer.

Election of Lieut. Joseph M. Roebling, now serving abroad with the United States Army Air Corps, as chairman of the board of directors of the company, was also announced. Lieutenant Roebling, first vice president since 1936, is a son of the late Ferdinand W. Roebling Jr., president from 1926 to 1936.

Also announced, following the directors' meeting, was the election of Archibald W. Brown as treasurer and H. D. Rathbun as secretary and assistant treasurer.

Lieut. Col. F. W. Roebling III is vice president of the company, now on leave of absence. He is serving in the Army's Corps of Engineers.

Copperweld's Wire Output Highest in Its History

Production and shipment of wire by Copperweld Steel Co., Glassport, Pa., reached the highest level in the history of the company during the month of August, William J. McIlvane, executive vice president, announced recently.

Since practically all of the wire manufactured by the company went to the Army Signal Corps for communication lines at the various battle fronts, production figures cannot be given.

The process used in the manufacture of the wire, since the beginning of operations 29 years ago, is unique. Pure copper is "molten welded" to a core of high strength alloy steel to produce a wire different from any other.

Discusses Application Of Polythene Plastic

Application of polythene plastic by the flame-spraying method previously used to apply coatings of metals was among developments described by Dr. F. C. Hahn, Plastics Department, E. I. du Pont de Nemours & Co., before the American Chemical Society recently.

Films of polythene thus applied are tough and highly impermeable, he disclosed, and when applied over metal surfaces provide a high degree of protection against brines, chemicals, and other corrosive agents.

Polythene is the generic name given to the new series of hydrocarbons of high molecular weight now being produced on an industrial scale in this country by the polymerization of ethylene under high pressure.

American Can Plans To Build New Plant

Construction will begin on \$6.5 million structure at St. Paul as soon after war "as labor, materials are available"

CONSTRUCTION of a new manufacturing plant on a 49-acre site in St. Paul, Minn., will be started by the American Can Co. as soon after the war "as labor and materials are available," Gordon H. Kellogg, vice president, announced recently from Chicago.

The new plant will represent an investment of about \$6.5 million according to present estimates, and will employ about 1000 people, more than double the number engaged in the present St. Paul plant.

In addition to the types of containers now being made in St. Paul lines will be installed for the manufacture of fruit and vegetable cans. Special emphasis will be placed on facilities for manufacture of containers for the meat packing industry. It is expected that there will be a large expansion of the company's meat can business in postwar period.

Principal buildings called for in the plans for the new plant are an office building, a service building to house employes' locker rooms, first aid station, cafeteria, and a machine shop to service can manufacturing machinery; a factory building for can making equipment and machinery, a lithography building and a warehouse.

The plant is so planned as to permit additions to certain of the buildings as circumstances require. Construction will be of structural steel and brick. Interior design will permit the most modern manufacturing operations. A total of approximately 700,000 square feet of floor space will be provided in the various buildings.

CHARLES ROEBLING TYSON

LT. COL. F. W. ROEBLING III

LT. JOSEPH M. ROEBLING

Profit-Sharing Employe Suggestion Plan Proposed

THE WEALTH of production ideas in the minds of employes is being tapped by the Cooper-Bessemer Corp., manufacturer of diesel engines, Mt. Vernon, O., and Grove City, Pa., by adopting a system based on a definite financial incentive for employes who suggest production shortcuts, material savings or reduction of safety hazards.

Experience from War Production Drive incentives has convinced the company that a suggestion system with more tangible benefits should become a permanent policy. Awards in the proposed plan are based on a percentage of the first year's savings resulting from an employe's suggestion. If the net estimated saving is $10,000, the suggestor receives $1000. Payment is to be 10 per cent of any savings effected, but in no event to be less than $5 for any accepted suggestion.

All suggestions are to be analyzed by a committee made up of six members, three representatives of labor and three representatives of management. Intangible suggestions will be evaluated by a committee made up of labor and management representatives.

The new employe suggestion policy will be adopted immediately upon its approval by the War Labor Board and the Commissioner of Internal Revenue. The policy is a formal development of the voluntary plan that has been followed for the past two years. The company believes the old plan initiated under Labor Management-War Production Drive activities did not provide sufficient incentive for the workers and did not have the benefit of authority and organization to stimulate and maintain employe participation.

In the above photo, a Cooper-Bessemer employe is receiving a special award check for $100 from T. J. McMichan, works manager, Grove City plant, for a suggestion which saved 2069 man-hours during nine months in production of engine valves for the war effort.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Sperry Gyroscope Co., New York, reports development of another flight instrument, gyrosyn compass, which is a directional gyrosynchronized with the earth's magnetic field.

—o—

B. F. Goodrich Co., Chemical division, reports alterations of processing equipment at its vinyl resin plant at Niagara Falls, N. Y., have been virtually completed.

—o—

Howe Scale Co., Rutland, Vt., has issued a catalog illustrating and describing its extensive line of warehouse trucks, trailers, etc.

—o—

Mathieson Alkali Works Inc., New York, reports production of ammonia underway at its Lake Charles, La., plant.

—o—

Allegheny Ludlum Steel Corp., Pittsburgh, announces purchase of property at St. Louis from the National Refining Co. The property, located at 209 Beaumont street, is being used as a district office as well as a warehouse.

—o—

Victor Adding Machine Co., Chicago, is making a substantial extension to its plant, this to include a new wing with approximately 20,000 square feet to house a cafeteria and a third floor manufacturing area.

—o—

General Motors Corp., New York, reports its total number of common and preferred stockholders for the third quarter of 1944 totaled 423,796, compared with 423,732 in the second quarter.

—o—

Graham, Crowley & Associates Inc., Chicago, consulting electrochemists and engineers, has been formed by Dr. A. Kenneth Graham and Dr. C. A. Crowley.

—o—

Allis-Chalmers Mfg. Co., Milwaukee in co-operation with the Illinois Institute of Technology, has launched a new post graduate educational course which will lead to a Master of Science degree in electrical or mechanical engineering.

—o—

Bureau of Mines, Washington, will establish an oil shale research and development laboratory at the University of Wyoming at Laramie.

—o—

Frederick W. La Croix, advertising counsel, has opened offices at 756 N. Milwaukee street, Milwaukee, to serve industrial accounts, specializing in the metal trade field.

Pennsylvania Salt Mfg. Co., Philadelphia, dedicated its new Whitemarsh Research Laboratories recently at Chestnut Hill, Pa.

—o—

Westinghouse Electric & Mfg. Co., Pittsburgh, announces that its Sunbury, Pa., plant, now devoted to manufacture of war communications equipment, has been selected as postwar plant for production of home radio receivers.

—o—

Betz-Pierce Co., Cleveland, has been appointed exclusive representatives and distributors for Delloy Metals, Philadelphia.

—o—

General Electric Co., Schenectady, N. Y., announces that it is employing 3600 war veterans in its plants, 2300 of them former employes of the company.

—o—

Baldwin Locomotive Works, Pittsburgh, reports that it has received an order for 180 tank recovery vehicles.

—o—

Wickwire Spencer Steel Co., New York, announces that its general sales office of the Mechanical Specialties division is now located at Clinton, Mass. Previously it was located at 500 Fifth avenue, New York. A district sales office will be maintained at the New York address.

—o—

Carl A. Underhill, producer's metal representative, Detroit, has opened his office at 1544 Buhl building, Detroit.

THE BUSINESS TREND

September War Materiel Output Well Below Peak

DESPITE intensive efforts to overcome the lag in certain war programs, overall munitions production continues behind projected schedules. Output of war materiel remains below the peak recorded last November, and on the basis of the downward tendency of some key industrial indicators in recent weeks, a further decline in war output probably occurred during September.

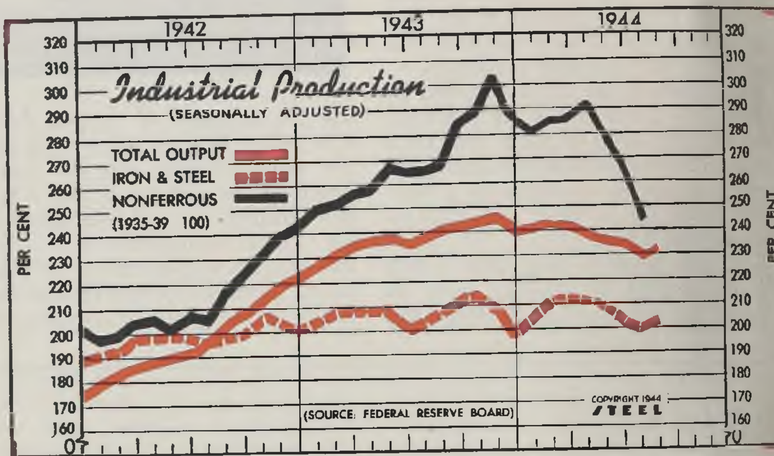
Inroads are being made into order backlogs of most war industries, in sharp contrast to the situation prevailing a year ago. In a basic industry such as steel, for example, a decided falling off in new orders has occurred recently, and there is prospect of substantial tonnage cancellations even though the European war should be prolonged throughout the winter months.

INDUSTRIAL OUTPUT — Federal Reserve Board's seasonally adjusted index of industrial production showed little change throughout August, advancing one point to 232, and compared with 242 in the like 1943 month. Peak recorded by the index of 247 occurred in October and November last year. Steel production was well maintained throughout August, while output of nonferrous metals continued to decline.

Overall activity in the metal fabricating industries during August continued at the level of the preceding month. There were large increases in output of heavy trucks, tanks, and some other critical ordnance items; aircraft production showed little change, while shipbuilding declined. Minerals output rose 2 per cent over July, reflecting increases in coal and crude petroleum production. Railroad freight traffic was maintained in large volume throughout August, but during September declined slightly below the comparable 1943 period due to decreases in all classes of freight except less than carload and miscellaneous shipments.

CONSTRUCTION—The backlog of construction projects awaiting the relaxation of government controls and the availability of manpower and building materials exceeds $10.5 billion, F. W. Dodge Corp. survey indicates. School and college buildings, hospital buildings, manufacturing, loft and office buildings and churches—in the order named—are the principal nonresidential classifications reported. The backlog of school and college buildings alone amounted to $767,-930,000, and all nonresidential building to $2,676,373,-000. The total of residential building, including apartment houses, dormitories and hotels, was $1,032,066,000.

August bookings of fabricated structural steel totaled 40,229 tons for bridge and building construction, according to reports received by the American Institute of Steel Construction from companies representing 75.9 per cent of the total average of the industry during the years 1923-25. This compared with 77,371 tons in July and 37,563 in like 1943 month. Shipments were up slightly to 44,118 tons, but remained below like 1943 month.



Federal Reserve Board's Production Indexes

(1935-1939 = 100)

	Total Production 1944	Total Production 1943	Iron, Steel 1944	Iron, Steel 1943	Nonferrous 1944	Nonferrous 1943
January	242	227	208	204	281	250
February	244	232	212	208	285	252
March	242	235	214	210	286	256
April	239	237	213	209	292	257
May	237	238	210	208	279	266
June	235	236	204	201	264	264
July	231	240	202	204	243	256
August	232	242	203	210	...	264
September	...	243	...	213	...	284
October	...	247	...	214	...	289
November	...	247	...	209	...	304
December	...	241	...	200	...	286
Average	...	239	...	207	...	270

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	93.5	96	96.5	99.5
Electric Power Distributed (million kilowatt hours)	4,330†	4,377	4,415	4,359
Bituminous Coal Production (daily av.—1000 tons)	1,973	1,921	2,002	2,030
Petroleum Production (daily av.—1000 bbls.)	4,700†	4,744	4,658	4,328
Construction Volume (ENR—unit $1,000,000)	$30.8	$19.2	$60.3	$50.7
Automobile and Truck Output (Ward's—number units)	20,935	20,880	20,055	21,265

*Dates on request. †Preliminary.

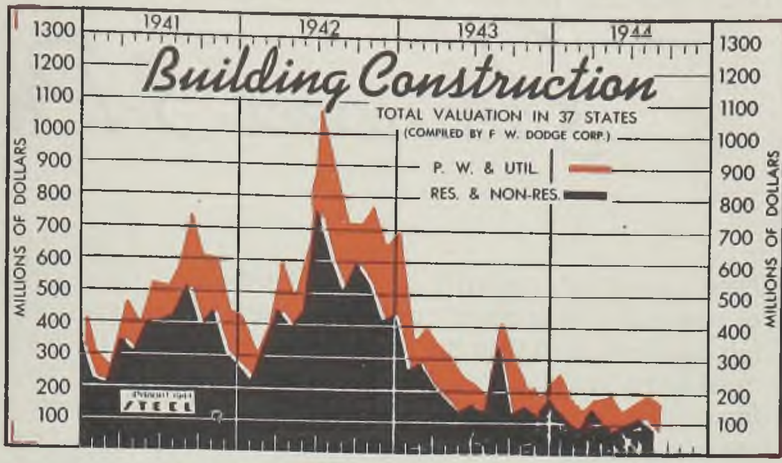
TRADE

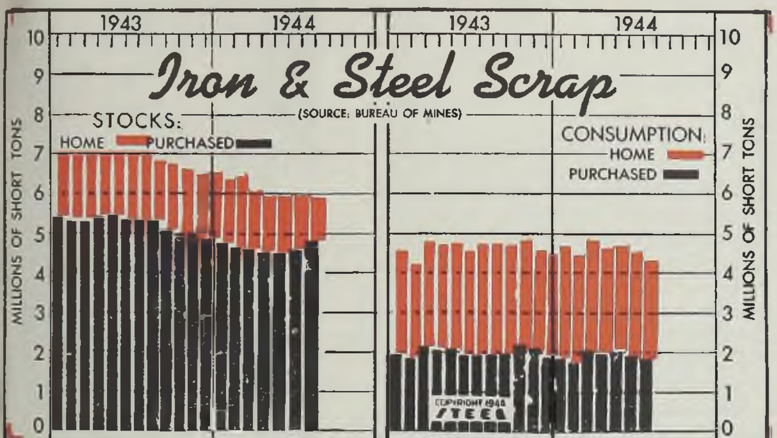
	Latest Period*	Prior Week	Month Ago	Year Ago
Freight Carloadings (unit—1000 cars)	910†	899	898	911
Business Failures (Dun & Bradstreet, number)	24	23	22	33
Money in Circulation (in millions of dollars)‡	$23,658	$23,558	$23,221	$18,818
Department Store Sales (change from like week a year ago)‡	+9%	+14%	+2%	+17%

†Preliminary. ‡Federal Reserve Board.

Construction Valuation In 37 States
(Unit—$1,000,000)

	Total	Public Works-Utilities 1944	1943	Residential-Non-Res. 1944	1943
Jan.	159.2	50.3	85.8	108.9	264.3
Feb.	137.2	55.1	112.9	82.1	280.5
Mar.	176.4	61.3	123.0	115.1	216.7
April	179.3	72.0	127.7	107.3	175.6
May	144.2	55.8	95.8	88.4	138.6
June	163.9	70.7	73.3	93.1	156.8
July	190.5	80.5	50.0	110.0	133.7
Aug.	169.3	69.4	73.4	99.9	340.8
Sept.	.....	....	175.1	.....	125.0
Oct.	.....	..	63.5	.....	150.0
Nov.	.....	....	59.0	.....	125.4
Dec.	.....	..	67.4	.....	184.9
Total	.....	..	1,106.9	.....	2,106.4





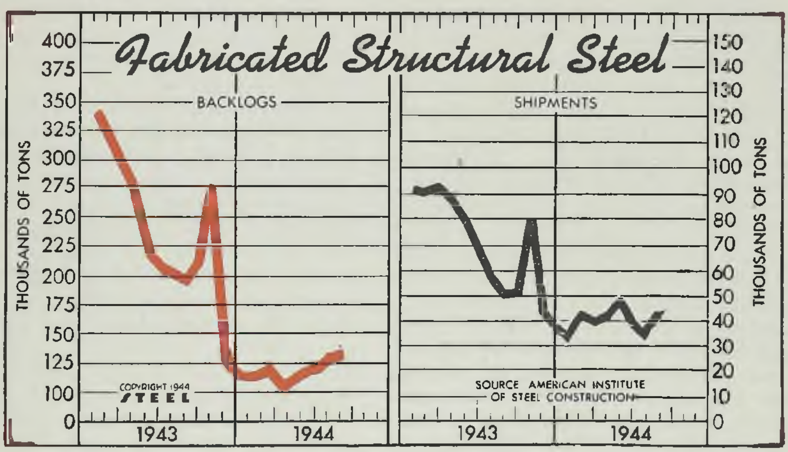
Iron and Steel Scrap Bureau of Mines
(Gross Tons—000 omitted)

	Consumers' Stocks 1944	1943	Total Consumption 1944	1943
Jan.	6,214	6,877	4,616	4,492
Feb.	6,134	6,871	4,414	4,178
Mar.	6,027	6,850	4,827	4,787
Apr.	5,932	6,918	4,629	4,642
May	5,966	6,905	4,683	4,723
June	5,991	6,916	4,460	4,493
July	5,909	6,860	4,423	4,670
Aug.	.....	6,778	.....	4,686
Sept.	.....	6,613	.....	4,657
Oct.	.....	6,456	.....	4,830
Nov.	.....	6,391	.....	4,581
Dec.	.....	6,448	.....	4,449
Mo.Ave.	.....	6,740	.....	4,599

Fabricated Structural Steel
(1000 tons)

	Shipments 1944	1943	1942	Backlogs 1944	1943	1942
Jan.	34.0	91.9	167.8	113.1	339.1	704.4
Feb.	41.7	90.8	164.6	117.6	321.0	706.7
Mar.	40.0	94.0	191.3	106.3	299.8	777.7
Apr.	42.2	86.6	187.2	111.2	272.5	772.4
May	48.0	78.9	184.2	116.3	220.6	843.8
June	39.6	68.4	182.7	122.7	207.1	869.8
July	35.5	56.8	189.9	125.4	201.8	808.6
Aug.	44.1	50.2	173.9	130.4	195.6	783.5
Sept.	...	51.8	169.8	....	208.1	716.0
Oct.	...	80.1	152.9	....	274.0	617.7
Nov.	...	42.7	130.4	....	134.6	566.6
Dec.	...	39.6	145.3	....	113.0	523.5

Source: American Institute of Steel Construction. Figures for 1943 to date cover members' reports only; for other years they are estimates for entire industry.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,041	$10,859	$8,639	$9,710
Federal Gross Debt (billions)	$210.8	$210.6	$211.2	$160.8
Bond Volume, NYSE (millions)	$33.5	$29.2	$24.9	$41.8
Stocks Sales, NYSE (thousands)	3,764	3,175	3,311	3,097
Loans and Investments (millions)†	$54,766	$55,041	$55,906	$50,143
United States Government Obligations Held (millions)†	$40,860	$41,113	$41,875	$35,947

†Member banks, Federal Reserve System.

PRICES

	Latest Period*	Prior Week	Month Ago	Year Ago
STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	253.2	250.7	250.3	248.7
Industrial Raw Materials (Bureau of Labor Index)‡	112.8	112.8	112.8	112.4
Manufactured Products (Bureau of Labor Index)‡	101.1	101.1	101.1	100.1

†1931 = 100; Friday series: ‡1926 = 100.

Electronics Now Permits . . . .

Balanced 3-Phase Resistanc

New system puts perfectly balanced load on all three phases of power line, thus greatly extending scope of resistance welding processes, including the joining of ¾-inch plates. No longer need heavy resistance welding be limited by unbalanced power loads and operation at extremely low power factor with accompanying high kilovolt-ampere demands and high power consumption. Lower original cost with reduced operating cost also featured

By G. W. BIRDSALL
Associate Editor, STEEL

CONVENTIONAL resistance welding systems have long suffered from the handicap imposed by their operation from a single-phase power source, whereas most plant power systems are three-phase. The resulting unbalance caused by a heavy load on one phase with no load on the other two constitutes a serious power problem, for it means that special provisions must be made in the way of oversize sub-station and plant distribution facilities.

Intermittent Loading: A further factor is that the welding current is needed for only a small fraction of a second. A considerable interval of time may elapse before the next weld. This imposes a series of extremely high peak loads on one phase of the power line. In between these peaks, there is no load. So power line voltage may vary widely due to this condition.

Special provisions must then be made to prevent these voltage fluctuations from causing poor operation of other electrical equipment on the lines. When several welders of this type are used on the same line, their interlocking effect can result in poor and non-uniform welds. In fact, on certain large installations (such as those serving 800 and 900-kva flash welders) it has been necessary to run in separate power supply lines for this reason.

Low Power Factor: Yet another problem is imposed by the fact that the welding may be done in a deep throat to accommodate welding some distance from the edge of the sheets or plates being joined. This means that considerable steel will be in the magnetic field of the welding circuit, resulting in high reactance and the extremely poor power factor that may result. It is not uncommon to encounter operation at 25 per cent power factor, or lower.

This means that to get a certain amount of actual welding current at the electrodes, extra or magnetizing current is required that may easily double the total current pulled from the line. And that involves still another boost in size of distribution facilities required.

These factors were explained recently by Mario Sciaky of Sciaky Brothers, Chicago, makers of resistance welding machines. He then went on to describe the various attempts to solve this power supply problem and the development of a new system that appears to be a significant improvement—a method made possible only by our increasingly greater familiarity with electronics and electronic equipment. It may well be an example of how electronic developments are going to affect manufacturing processes and equipments in the postwar era.

"Stored Energy" Welding: One solution to the power supply problems described is found in the development of "stored energy" type welding systems. These usually employ mercury tube rectifiers to charge a magnetic inductor or a bank of condensers, which subsequently are discharged through a welding transformer to produce the weld. Since each phase of a three-phase line can be equipped with a rectifier tube to charge the stored energy welding machine, these equipments place a constant balanced three-phase load on the power system and thus obviate the power supply difficulties described.

However, welding current from this type of equipment is limited to one pulse, which dies down in a small fraction of a second. Thus this factor limits application of this system when more than one impulse may be wanted to deliver the large amounts of power required in spot and seam welding heavy steel plates, flash welding large diameter bars and widths of strip (or any resistance welding job where considerable cross section of steel is to be heated to welding temperature).

For this reason, Mr. Sciaky points out, there have been several attempts to develop a balanced three-phase resistance welding system that would handle these

(*Please turn to Page* 278)

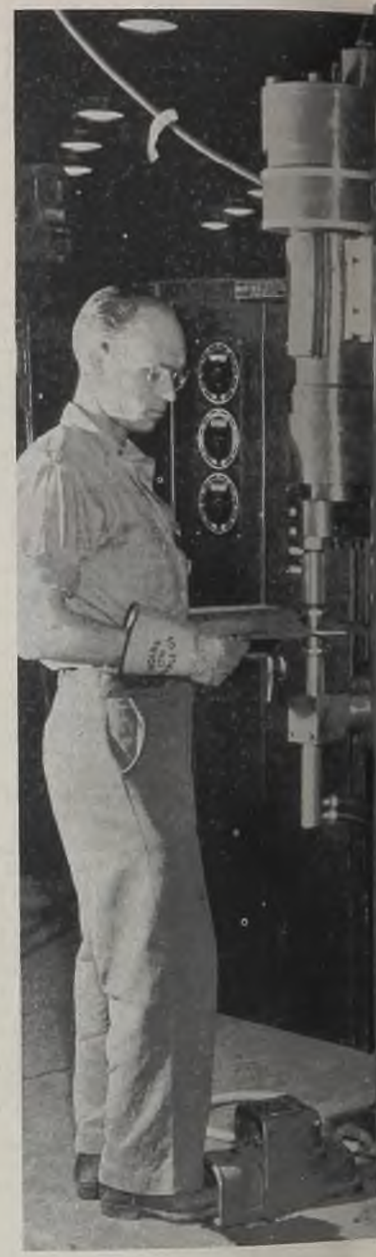
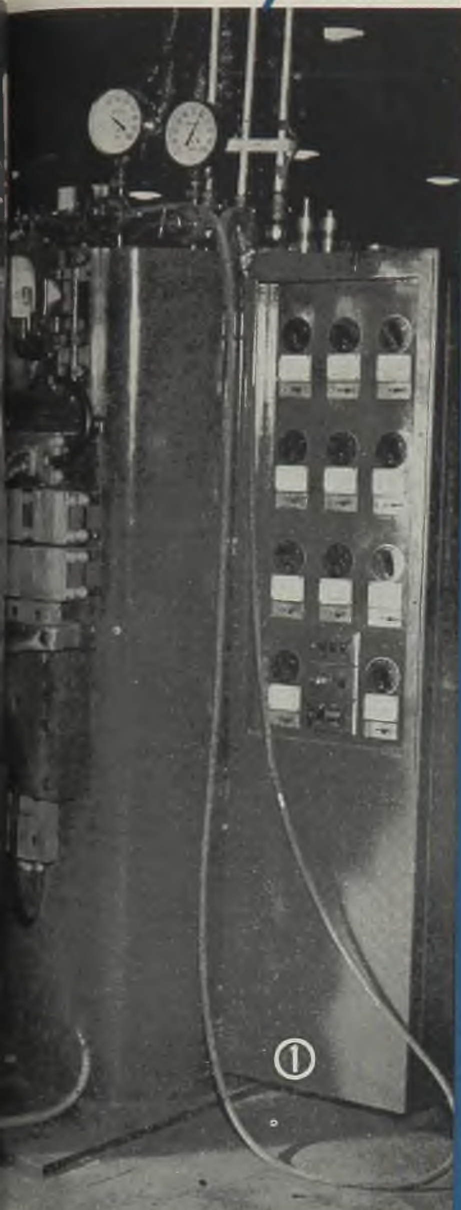
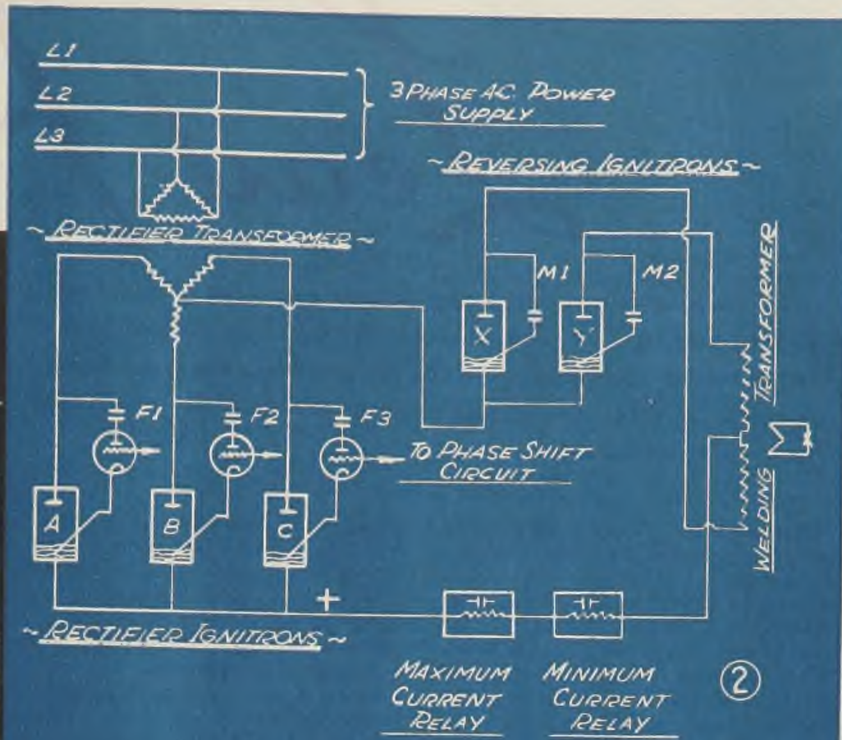


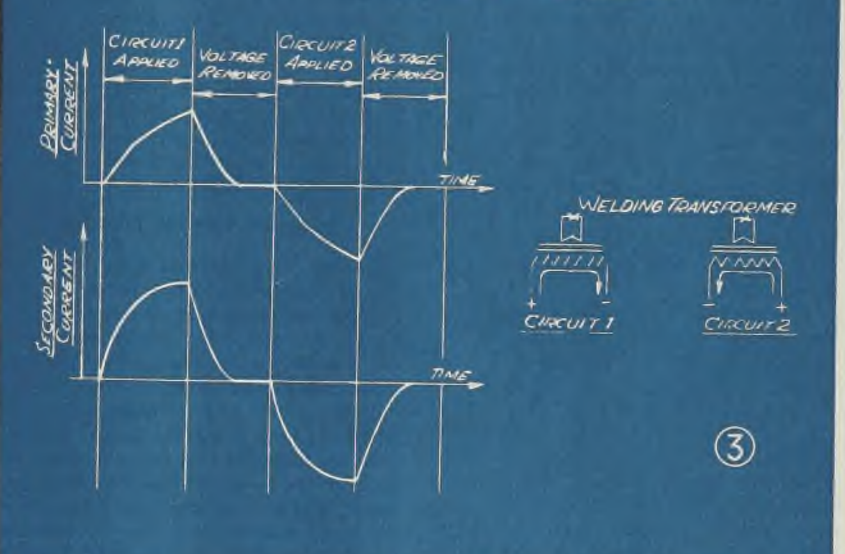
Fig. 1—This three-phase to single-phase welder has been used by Douglas Aircraft for almost a year spot welding heavy gage armor plate. Rated 140 *kva, unit preheats material before welding; has adjustable quenching; combines welding with austempering, grain refining and tempering heat treatments—all in same cycle. Variable pressures up to* 12,000 *pounds are available at the electrodes for forging the weld*

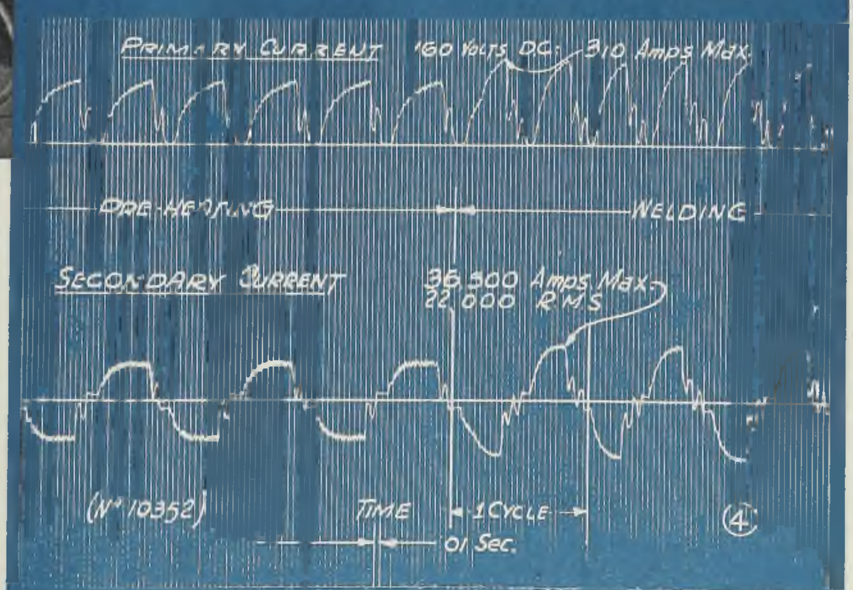
Fig. 2—Basic diagram of Sciaky three-phase to single-phase power

Welding









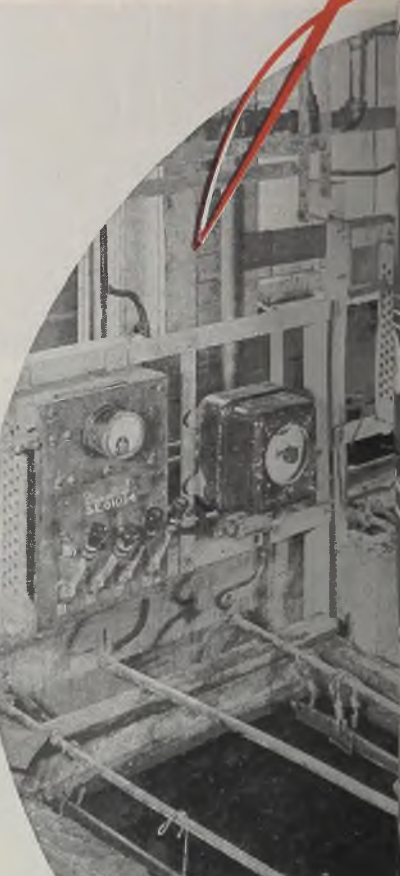
supply system for resistance welding machines. See text for explanation of operation

Fig. 3—Curves showing method of converting direct current to single-phase alternating current. All illustrations furnished by Sciaky Brothers, Chicago

Fig. 4—Drawn from actual oscillograph records, these curves show primary and secondary current in a welding transformer using the new power supply system. Note welding cycle is 0.25-second long, which means welding current is 4 cycles per second

Lead Plating

. . . may find increasing applications after the war in protecting steel against corrosion, eminent authority believes, since many earlier shortcomings of the process have been overcome. Smooth, uniform and dense deposits within close tolerances now being obtained



Characteristics of Lead: As a plating medium for iron and steel, lead, by reason of its peculiar chemical properties, should be most attractive. It resists atmospheric corrosion remarkably well, not only because of its less negative electrode potential as compared to zinc, chromium and nickel but also because of the formation of a relatively continuous and adherent oxidized film.

The metal flows easily under pressure, does not work-harden and consequently is able to conform to changes in the steel base with a minimum of disruption. It is always cheaper than tin and usually cheaper than zinc (in 1939, the last normal year, lead sold at 5.05 cents, zinc at 5.51 cents and tin at 50.3 cents per pound). Furthermore a greater weight of lead is deposited in equal times or with equal currents than with most other plating media.

For example 1000-ampere hours, with comparable solutions, will deposit 8.5 pounds of lead as contrasted to 5.2 pounds of copper, 2.4 of nickel, 4.9 of tin and 2.7 pounds of zinc. To be sure the thickness of the lead coating is not in these direct ratios because of the higher specific gravity of lead. The metal is attacked by the strongly oxidizing acids such as nitric and acetic but it resists remarkably well the action of cold hydrochloric and dilute sulfuric acids.

Not Used Extensively

Physically, electrodeposited lead is superior to hot dipped coatings because it is more ductile (being purer) and there is a minimum amount of stress present in the coating (in the hot dipped coatings there is a stress represented by a 2.5 per cent shrinkage in cooling).

Lead has not been as extensively used as zinc, tin and nickel as a protective coating because, from a physical standpoint, the metal possesses some very serious disadvantages. First, it has poor plating characteristics, depositing in the form of a loosely adherent, sometimes spongy metal which is prone to form trees and very likely to contain pinholes. Second, the metal has a low melting point (327 degrees Cent.), is relatively soft, and will not resist high temperatures or wear and abrasion. Third, the initial coating of oxide or sulfate which is formed on exposure to the atmosphere gives resistance to further corrosion but becomes unsightly, particularly when it is contaminated with the salts of other base metals. Even under the best conditions lead is never bright or lustrous and not as attractive as nickel, tin or aluminium.

Uses: A large tonnage of lead has always been used as a protective coating for iron and steel in the form of the hot-dipped coatings. Terne plate (a lead-tin alloy containing 10 to 50 per cent of tin) has found wide acceptance in industry for gasoline containers and roofing and lately other alloys of lead containing relatively small amounts of zinc, tin or antimony have been developed and used on sheet, wire and outdoor hardware.

Irregular Objects Difficult

By hot dipping, equal weights of lead can be laid down much more quickly, cheaply and easily than by electrodeposition. On the other hand, hot-dipped coatings have some serious shortcomings. When dipping irregular objects, the coatings are prone to flow when solidifying and form unsightly "tear drops" and experience indicates that these coatings are as likely to have pinholes as the plated ones. The surface tension and fluidity of the molten metal limit the thickness of the coatings which may be laid down in dipping but by electrodeposition a coating of any reasonable thickness may be deposited. Lead plating also competes actively with hot dipped coatings on the basis of the purity of the coating and it is common knowledge that, generally speaking, pure metals resist corrosion better than impure ones. Lead does not alloy with iron so that it becomes necessary to use some alloy of lead with metals such as tin, zinc or antimony to get adherent deposits. Although this does not add materially to the cost of the metal, it does alter the chemical characteristics and usually lessens the resistance to corrosion.

Just before the present conflict there was a decided trend toward a wider use of plating because the special needs of the military (where cost is less important) have brought with it very encouraging developments which may in turn lead to a much wider postwar use of electrodeposition. Lead plating is now commonly used for articles where protection from sulphuric acid or its fumes, is involved. Such plates also resist the action of brine solutions and the very rapid growth of the frozen food industry will bring with it many new applications for lead plating in tanks, fittings, and hardware. It is extensively used in the chemical industry and in the lining and protection of shell, torpedoes, mines and bombs. In the latter connection the writer has seen shell which, after 20 years exposure to the hot, humid climate of Panama were unaffected. Many small machine parts, bolts, screws and washers are plated with lead as well as many parts for lead storage cells. The viscose and plastic industry, where small amounts

By DR. J. L. BRAY

Head, School of Chemical and Metallurgical Engineering
Purdue University
LaFayette, Ind.

Lead may be electrodeposited at the rapid rate of 8.5 pounds per 1000-ampere hours with equipment such as shown here. Character of deposits have been improved measurably as the result of war research

of iron contamination are particularly bad, are finding lead plating to be a solution to some of their problems.

Solutions: While it is true that lead has been deposited from a large number of different solutions such as the nitrate, fluosilicate, perchlorate, acetate, fluoborate, oxalate, dithionate, sulphamate and alkaline plumbites and cyanides only two, the fluosilicate and fluoborate, have survived and are in common use today.

Preparation of the Base Metal: Although it is axiomatic in plating to clean the article very thoroughly because of the poor adherence of lead to iron, it is found expedient to use more than ordinary care in preparing an iron surface for lead plating. There can be no compromise, either the surface is clean and can be successfully coated or not clean when only failure attends any attempt to plate —there is no cheaper, half-way point.

Usually the cleaning procedure consists of the removal of oil or grease with conventional solvents followed by electrolytic cleaning in an alkaline electrolyte and by a short pickle in 5 to 8 per cent sulphuric acid. Pickling in either hydrochloric or sulphuric acid should continue for only a short time experience showing that prolonged immersions affect the adhesion of the deposited metal probably through the absorption of hydrogen by the steel base.

Frequently sand or steel shot blasting is used to dislodge fine particles of sand adhering to the article which might otherwise cause pinholes. As a matter of fact sand blasting is really more effective than pickling in promoting adherence of the lead to the steel base. The bond is entirely mechanical and the rough, matte-like surface thus produced constitutes a better foundation for the deposited metal. For certain work it is found necessary to use a preliminary strike of copper on the iron base.

Character of the Deposit: Iron is anodic to lead and consequently the lead coating offers only mechanical protection. Any breaks or discontinuities in the coating will be sites of accelerated corrosion of the iron base. As porosity rather than thickness of coating is ordinarily the most important property, it has been established that under commercial conditions a thickness of 0.0001 to 0.0002-inch is usually sufficient to pass a porosity test. Lead, however, is relatively soft, the thin oxidation film may be worn away, with the result that the common limits demanded in industry are 0.003 to 0.005-inch. The character of the object plated will also have a bearing on the thickness of the coating required. Light coatings, subject to little wear, may be as thin as 0.0005-inch. Most steel or iron articles are coated with 0.0005 to 0.008-inch while severe exposure conditions in chemical plants where temperatures may be high, call for as much as 0.05-inch. The ferroxyl test is commonly used for determining and controlling porosity. This consists in washing the article with a solution containing 10 per cent sulphuric acid in order to remove particles of iron or iron oxide which may interfere with a proper interpretation of the test.

The articles are then treated with another containing 20 g/L of sulphuric acid and 10 g/L of potassium ferricyanide. The presence of pores is indicated by the appearance, within one minute, of bright blue spots on the surface of the plate. The thickness of the coating may be measured with micrometers, microscopic examination of a cross section or with the Brenner Magne gage. Incidentally the slight porosity of the lead coating may be overcome by mechanical treatment in some instances. Commonly sheet and wire are given a light pass through rolls or dies and irregular objects a slight burnishing effect by steel balls.

The Fluosilicate Bath: No ideal lead plating bath has been found. Each has its peculiar advantages and disadvantages which dictate its uses. The fluosilicate bath is cheaper for large scale operations (it has been used for years in the Betts process for the refining of crude lead) but it is difficult to prepare for small scale plating operations. Within the ordinary limits of temperature and composition side reactions go on with the formation of silica and lead fluoride within the bath. Unless these are removed by filtration, which is difficult and expensive, these are liable to promote the formation of pinholes. Since it is difficult to plate directly on steel or iron with this bath, it is usually necessary to use a copper strike. The plating baths used fall within the following limits:

	g/L
Lead	75 to 180
Total fluosilicate	150 to 190
Glue	0.2 to 5.4

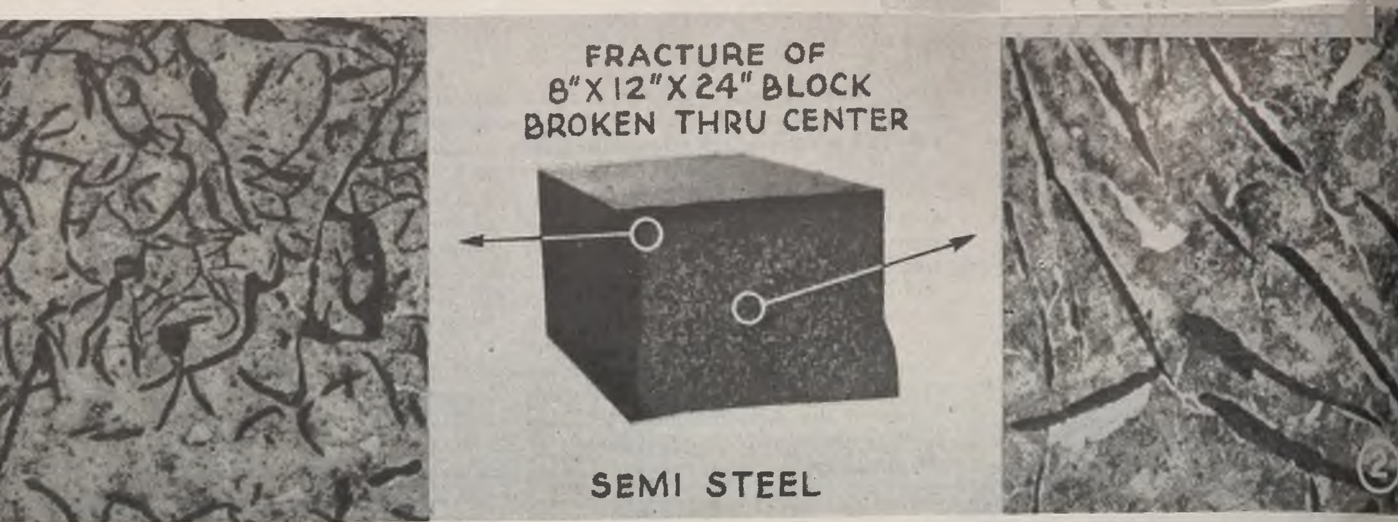
The operating conditions for commercial plating are:

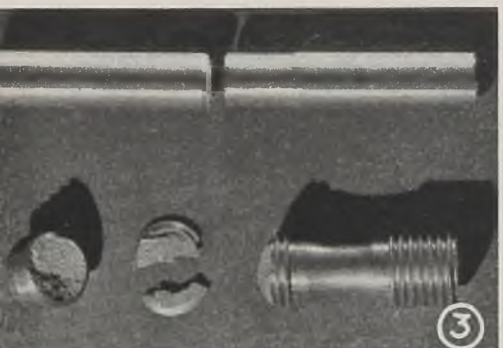
Cathode Current Density	5 to 80 amp. per sq. ft.
Anode Current Density	5 to 30 amp. per sq. ft.
Tank Voltage	0.1 to 0.2-volt
Temperature	35° to 40°C.
Current efficiency	100 per cent

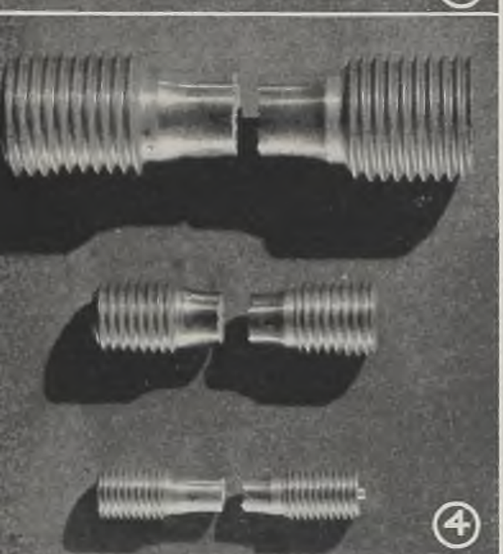
The anodes are a "chemical" or "corroding" grade of lead and the bath must be closely controlled by frequent analyses for lead and fluosilicate. Impure anodes give rise to a spongy deposit and too much glue to a dark-colored one.

The Fluoborate Bath: This type of

(*Please turn to Page* 288)



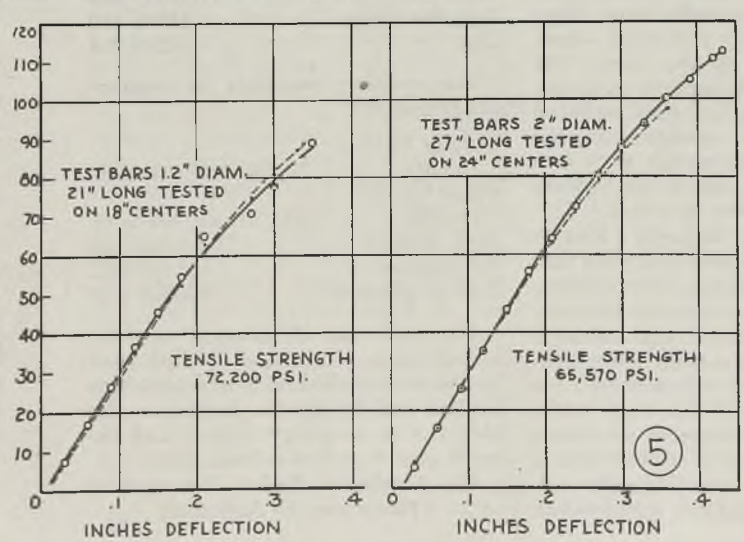


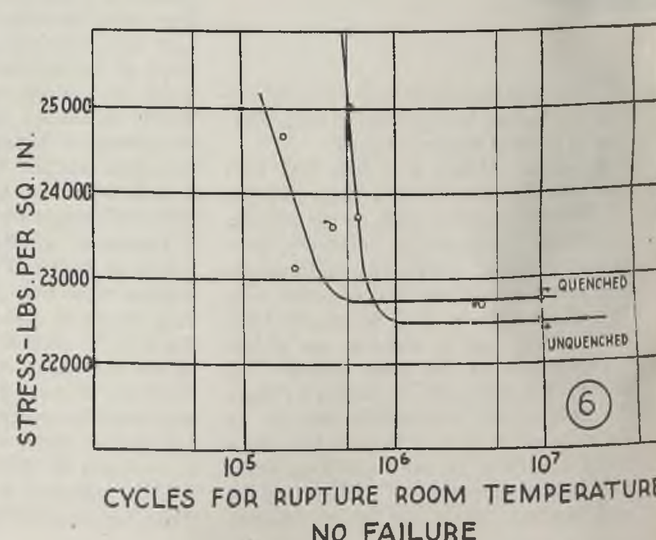


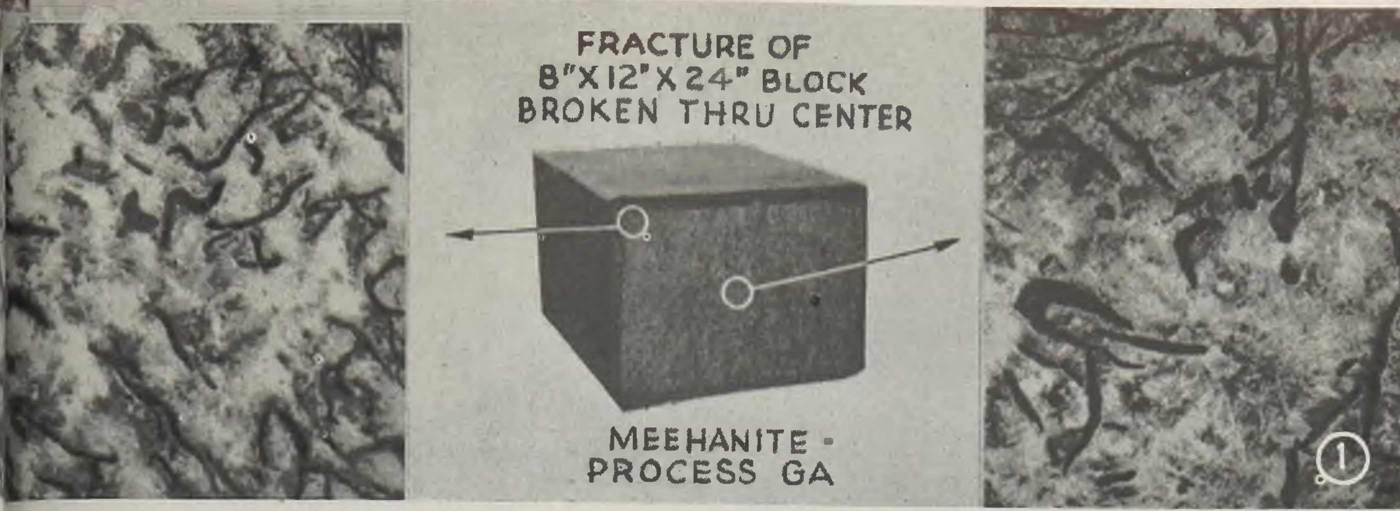
Dependability of ENGINEERING PROPERTY TESTS

In testing metals for physical characteristics, it behooves the engineer to ascertain which tests are truly representative, sufficient in number and thoroughly reliable. Tests for single characteristic often more dependable

By H. A. REECE
Vice President
Meehanite Metal Corp.
New Rochelle, N. Y.







TESTS for engineering properties of metals have been developed over a long period of time in order to provide engineers and product designers with certain definite measurements to facilitate the proper applications of materials. Such property tests are numerous and varied and, of course, there are frequently a number of different types of tests to determine the same property. The important thing from the designer's standpoint is the correct interpretation and analysis of the test figures available. In such an analysis two questions must be kept in mind:

(1) Is the method of testing dependable and are the values obtained by the test true and acceptable?

(2) Is the test result applicable to the casting or design being used?

The designing engineer rightfully feels that he should not be involved in speculation and generally should not be required to investigate the basic data on any material in order to determine the allowable service stresses and a safe procedure in design. Recommendations in this regard should always be clearly presented, permitting accurate comparison with other materials as a result of the accumulation of data from tests. The product designer is interested in possessing an assurance as to the reliability and uniformity of the material. Lacking sufficient basic data to establish a definite method and practice of design for any material, the engineer inclines to comparison with materials for which he has better essential data and attempts by deduction to establish the basis of design for the material in question.

Hence, it is most important that the test figures be the actual value of the test specimen. Tests are dependable only in proportion to their adaptability in structural design.

There is, of course, another phase of dependability which applies only to the question as to whether or not the test has been conducted in such a manner as to define literally a characteristic of the material. This aspect of dependability is affected by (1) quality of the physical equipment for tests, (2) knowledge and experience of the test engineer, (3) method and accuracy of preparation of the test specimen and (4) the applicability of the test to stresses in service.

The Simpler the Better

From the standpoint of interpretation and application, a test which involves only the determination of a single characteristic is more dependable than those providing a combination of characteristics. Thus, a tensile test is fundamentally dependable because it provides but one characteristic.

The importance of following correct

Fig. 1—Photomicrographs from a block of Type "GA" Meehanite reveal metallurgical regularity throughout block

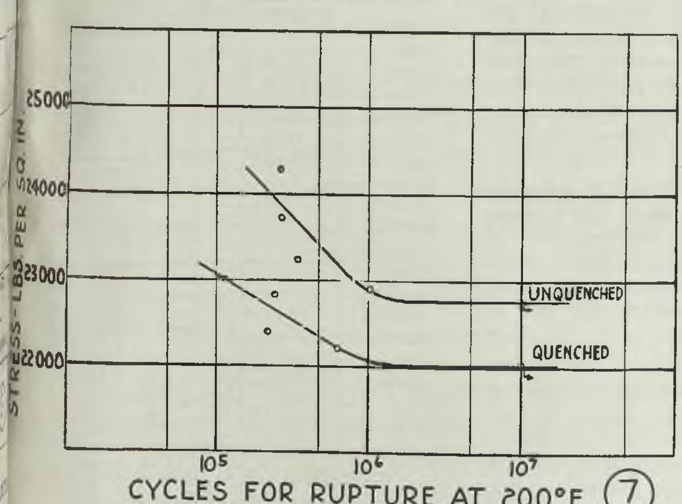
Fig. 2—Variations in metallurgical structure of an iron block shown by photomicrographs taken from locations shown

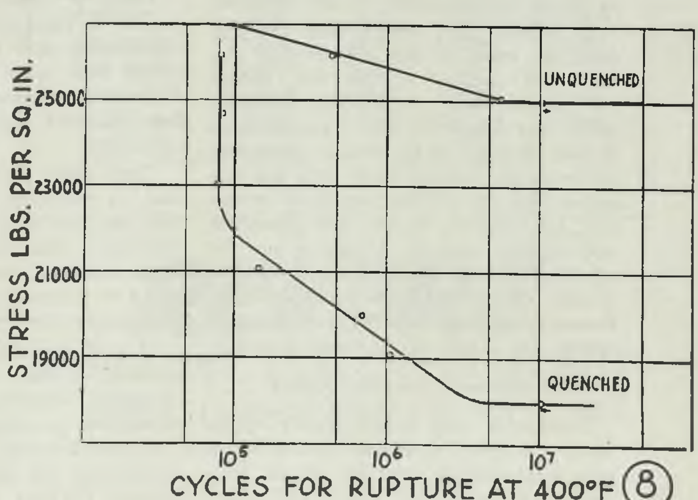
Fig. 3—Results of improper testing which would provide unreliable figures

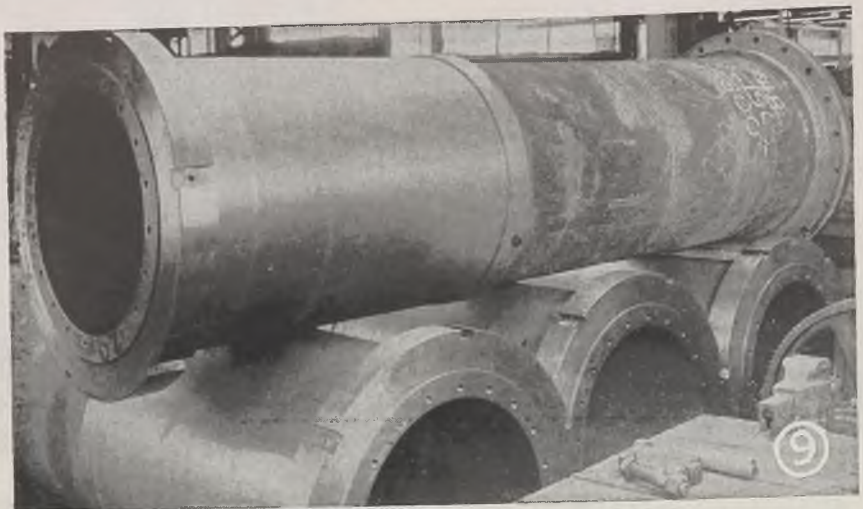
Fig. 4—Correct handling of proper test bars on good equipment results in tensile fractures like those shown

Fig. 5—Results of fiber-stress tests on two sizes of Meehanite bars

Figs. 6, 7 and 8—Curves showing endurance limits, pounds per square inch, for cast iron parts subjected to rapid heating and quenching, with rupture occurring in Figs. 7 and 8 at 200 and 400 degrees Fahr., respectively







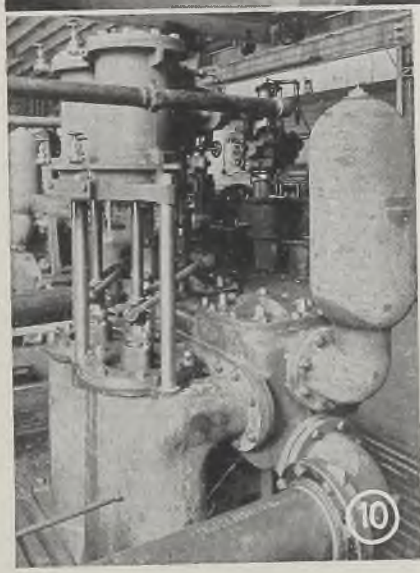


Fig. 9—Type "GC" Meehanite stern tube castings for Maritime Commission weighing 15,800 pounds each. They are tested hydrostatically before assembly

Fig. 10—The "GC" Meehanite castings in this 10 x 11 x 12-inch marine pump mounted on test block are hydrostatically tested to 350 pounds per square inch before assembly

procedure in making property tests is illustrated in Fig. 3. The tensile tests obtained from the specimens shown are neither representative of the material nor usable by an engineer in calculation. In one case the tensile strength is affected by the chamfer of the bar and probable misalignment. In the other case, the strength would be affected by the holders which are ill-meshed with the threads of the test specimen. However, each of these tests was reported as being representative of the material.

It follows that tensile bars for test purposes must fit the holders and the machined section of the bar should be smooth and of known diameter, while the shape of the test specimen should be such as to involve concentric loading. In making such tests the operator must be skillful enough to recognize the meaning of the test procedure and should exercise judgment on the correctness of the specimen provided. He should, of course, insist upon the performance of all functions of the test within the limits of required accuracy.

Equipment Must Be Perfect

Commonly used tensile testing equipment involves universal or spherical type joints which must be ground to a perfect fit and kept clean and lubricated with a proper oil. The importance of this is seen in the fact that eccentricity of loading of as little as 0.001-inch will mean a reduction in apparent stress of approximately 1000 pounds.

If the threaded type tensile specimen is used, the fit of the thread in the holders must be accurate and the pitch of the thread the same for both holders and test specimen. Threads on the specimen should be concentric with the reduced section of the specimen and the joints must be hand-tight as to fit.

Although little consideration is given to the fact, the rate of application of the load on the specimen is of prime importance in most property tests. It is the responsibility of the tester to see that test specimens are properly placed in the testing machine with accurate alignment, and if this is done and the testing equipment maintained correctly, the results of the tests undoubtedly will be characteristic of the material and thus usuable by the designing engineer.

Materials Cause Tests To Differ

Fig. 4 illustrates the break position on test bars properly handled and broken. Correct handling by the tester and good testing equipment are indicated.

When it comes to interpreting test results, it becomes the function of the engineering staff to ascertain that tests which have been made are truly representative in character, of sufficient number and that they adequately indicate reliability.

Tests differ with regard to material and, as previously pointed out, a single test may be used for determination of multiple characteristics. Thus, with high strength iron castings, the yield point is generally about 80 per cent of the tensile strength.

One of the difficulties in testing iron castings is that while certain physical property specifications might be obtained on an arbitration test bar, due to irregularities and uncorrected structural formations the castings themselves may possess physical defects or lack soundness. In other words, the test bar properties fail to tell whether the casting itself will be acceptable and even a chemical specification will not assure casting soundness. For example, in the manufacture of ordinary iron castings, the structure at various points can be entirely unrelated as shown by the photomicrographs in Fig. 2 of the matrix in two sections of an ordinary iron block.

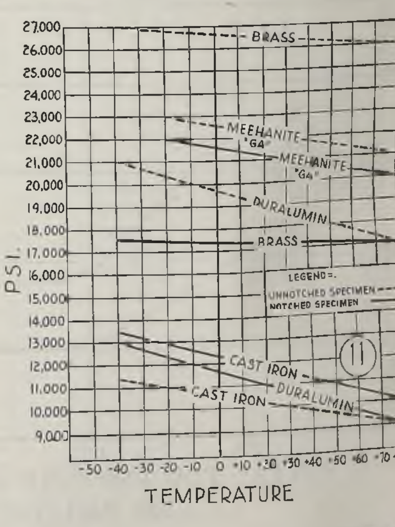
Methods of Controlling Irons Studied

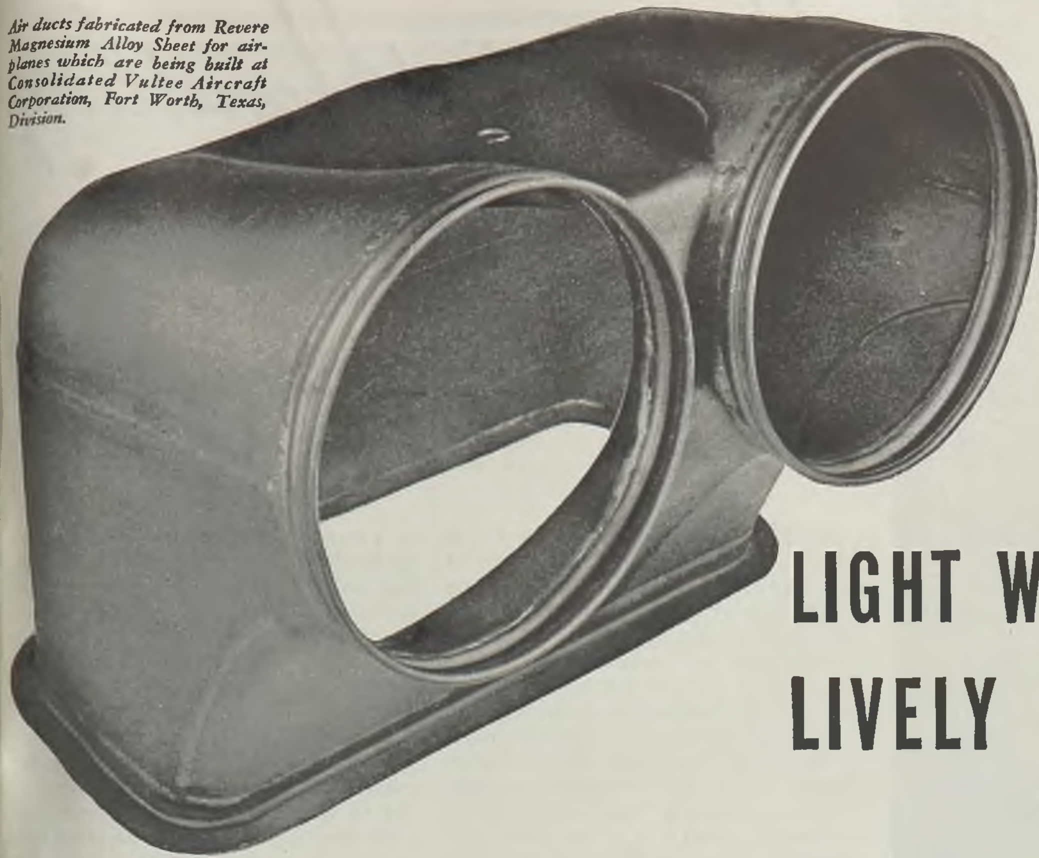
As a result, much metallurgical research has gone into the study of ways and means of controlling irons so that structural irregularities and defects do not appear. Such materials, of which Meehanite is one, depend upon the physical constitution of the metal. This constitution can be regulated by the arrangement of the structural components one with another, as well as properties in types of these components. These controls also result in more rapid solidification of the molten metal and so insure a finer dendritic crystalline structure and a greater depth of solidity penetration.

Fig. 1 includes photomicrographs taken from a block of Type "GA" Meehanite (50,000 pounds per square inch minimum tensile strength) and indicates what may be achieved by controlled production and regulation of the structural components of the metal. The increased speed of solidification of this material refines the crystal grain to such an extent that structural solidification may be achieved in conjunction with

(*Please turn to Page* 296)

ENDURANCE LIMITS AT VARIOUS TEMPERATURES





Air ducts fabricated from Revere Magnesium Alloy Sheet for airplanes which are being built at Consolidated Vultee Aircraft Corporation, Fort Worth, Texas, Division.

LIGHT WEIGHT IS LIVELY WEIGHT!

REVERE Magnesium Alloys

DON'T be misled by the inevitable fact that thus far the use of magnesium for structural purposes has been largely confined to the airplane. As more and more of this remarkable light metal becomes available (and more is being released every day) you will find magnesium creating the new light metal age, in which a great many things that move will do so more quickly and economically and easily because magnesium is used in them.

Remember that it costs money to move anything—trucks, trailers, elevator cages, railroad cars, buses, *anything.* And it costs money to ship to, and move around a plant, the materials of which they are made. It takes effort to move such common articles as vacuum cleaners, hand tools, portable typewriters, chairs. Weight reduction will be *so* important after the war!

Revere Magnesium Alloys are available now in the form of sheet and plate, rod and bar, tubes and shapes, forgings and forging stock. The Revere Technical Advisory Service will gladly assist you in obtaining magnesium's maximum advantages... Write for your complimentary copy of the new 32-page booklet, "Revere Magnesium Alloys and the Light Metals Era."

THE FOUR REVERE MAGNESIUM ALLOYS

Working Characteristics	"M"	"FS-1"	"J-1"	"O-1"
FORMABILITY	Good	Excellent	Fair	*
STRENGTH	Good	Good	Excellent	Excellent
WELDABILITY	Excellent	Good	Excellent	Excellent
DEEP DRAW	Excellent	Good	Fair	*
FORGEABILITY	Excellent	Excellent	Excellent	Excellent
MACHINABILITY	Excellent	Excellent	Excellent	Excellent

*Heat-treatable extrusion or forging alloy

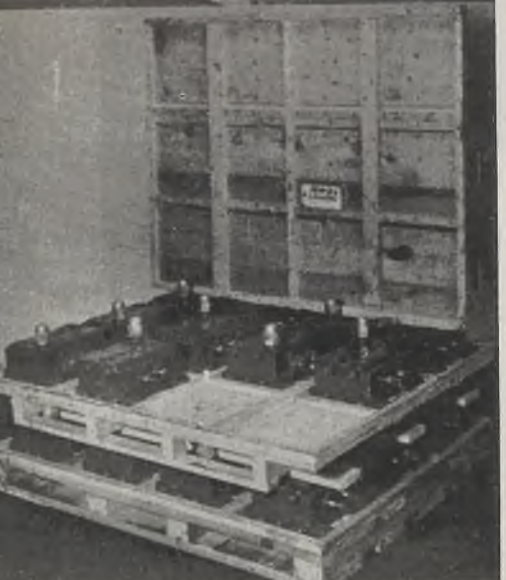
REVERE

COPPER AND BRASS INCORPORATED

MAGNESIUM—ALUMINUM DIVISION

Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N.Y.



Integrated Handling

. . . . saves $21.60 and 19 manhours per group of 36 valve units in shipping from supplier to assembly line; is excellent example of what can be done by improved palletizing for efficient handling of materials

By EZRA W. CLARK
Vice President and General Manager
Clark Tructractor Division
Battle Creek, Mich.

INVESTIGATION has disclosed that cost of handling during manufacturing can run as high as 30 to 50 per cent of the total production cost. The reason that such an important item of cost is not detected and reduced to its proper level lies in the fact that handling costs are usually hidden or combined with other costs. It is quite a difficult matter to figure handling costs exactly, for so much handling is tied directly into production operations. Only after better production methods are developed through motion studies and improved flow of materials, coupled with maximum application of mechanical handling aids, do original high handling costs show up by important reduction in total production costs.

Manufacturers alert to the great possibilities in efficient materials handling are doing a number of things to obtain maximum benefits from improved techniques and equipment now available. All materials handling activities are centralized under one man who directly supervises flow of material through the plant, organizes trucking and conveyor routes, works directly with plant layout men and production engineers to employ every possible shortcut.

Material schedules are planned to the most minute detail, so no holdup is ever experienced because work is not at hand at every machine. Storing of materials is put on a scientific basis, locating raw materials or parts at or near processing or assembly lines. Assembly stations are engineered for quick, easy assembly . . . The same for testing, packaging and the like.

Incoming Parts Shipments: A phase of materials handling that is attracting an unusual amount of interest is that having to do with incoming materials and parts sent in from outside suppliers and from other company plants.

Many new plants built for war production work employ every known device for efficient handling. Yet their incoming shipments may be totally neglected as far as contributing to the efficiency of materials handling is concerned. Packaging subassemblies individually, for instance, means a shipment has to be built up package by package at the shipping end, unloaded piece by piece at receiving end, moved to storage, moved out of storage, used in assembly—all item by item. The repetitive handling thus involved can run into important money.

Typical Example—A Valve Assembly: An excellent illustration of what is being accomplished by improved handling

(Please turn to Page 298)

(Top to bottom)—

Fig. 1—Original shipping method involved packing two valve units in crate. Crates then had to be handled individually through loading, unloading, stocking and distributing operations

Fig. 2—Improved packaging utilizes double faced pallet and spacer sections. Spacers are fitted with pockets to hold 12 units, three layers form complete package as shown in Fig. 3

Fig. 3—Lower face of spacer sections has members spaced to accommodate vertically projecting fitting that extends from top of each valve. See Fig. 2. Complete package is securely bound together with heavy steel strap

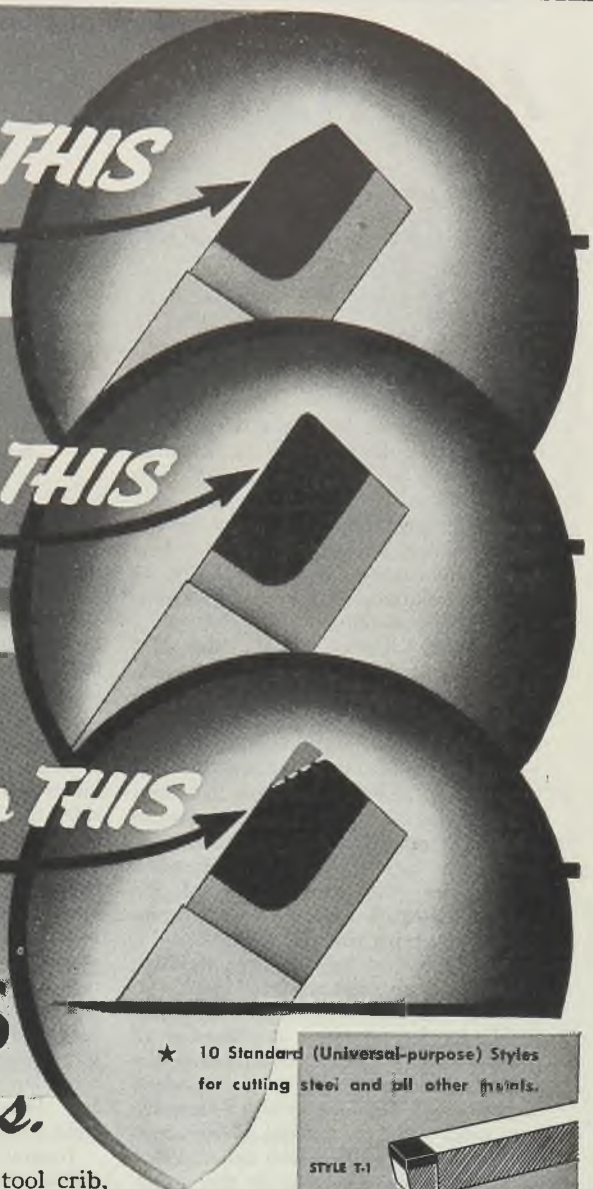
Fig. 4—Pallet is used over and over, being knocked down and returned to supplier's plant. Note how pallet and spacer sections are tied together for return

Fig. 5—Power fork truck handles package as a unit. Thus 36 valves are simultaneously moved in loading, unloading, stocking and distributing, greatly increasing efficiency of these handling operations. Also tiering as illustrated permits utilization of air space formerly wasted

Why pay more for THIS

When you can get THIS

and quickly grind to THIS

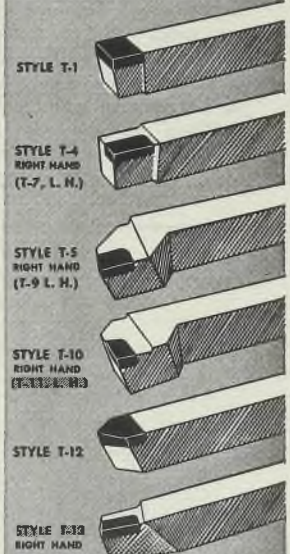


Specify STANDARDS *for Maximum Savings.*

With Standard (Universal-purpose) Carboloy Tools in your tool crib, you are prepared to meet your carbide tooling requirements in three ways: (1) You can use Standards "as is" for a large percentage of your general machining; (2) you can quickly grind minor variations when required; and, (3) for emergency tooling, you can adapt Standards to highly specialized shapes, even intricate forms, to meet urgent needs. Modern techniques for grinding carbides (training film strip available) permit amazingly rapid grinding. Conversion to special angles usually requires but little more than ordinary regrinding of dull tools.

Hundreds of leading plants have found Standard Carboloy Tools the answer to maximum convenience and economy in carbide tooling. Available in 10 styles, all commonly used sizes, and 5 grades for cutting steel and all other metals and non-metallics.

★ 10 Standard (Universal-purpose) Styles for cutting steel and all other metals.



CARBOLOY COMPANY, INC.
11141 E. 8 MILE AVE., DETROIT 32, MICHIGAN
Birmingham · Chicago · Cleveland · Detroit · Los Angeles · Milwaukee · Newark
Philadelphia · Pittsburgh · Thomaston
(Also sold through many leading Mill Supply Distributors)

CARBOLOY
TRADEMARK

STANDARD TOOLS & TIPS

"You ALWAYS Get Standards FASTER Than 'Specials'"

SEND FOR FREE CATALOG GT-175

METALLIC ARC WELDING ELECTRODES

Once the idiosyncrasies of copper materials are understood, competent structures may be built with confidence by welding, Mr. Lawrence points out in the thirteenth article in his series. About half may be arc welded. Concluding article in STEEL October 16 will cover aluminum electrodes

By HAROLD LAWRENCE
Metallurgist and Welding Engineer

LESS than half of the 50 weldable copper materials may be joined by metallic arc welding.

This statement does not imply any fundamental shortcoming in metallic arc welding as a process but it does reflect the rather difficult problem presented in the welding of many of the copper materials due primarily to their heat conductivity and secondarily to some metallurgical phenomenon encountered during welding.

However, thousands of successful welding installations have been made and the copper companies have built up a wealth of valuable information concerning the best techniques for joining their materials. Some sad experiences of several fabricators have emphasized the need for close consultation with the suppliers of copper and copper alloys before undertaking the first job. Once the idiosyncrasies of the copper materials are understood, competent structures may be built.

In addition to metallic arc welding, the following methods are employed: Carbon arc, oxyacetylene and resistance welding. Sometimes a combination of methods can be used to advantage by buttering the joint with an oxyacetylene deposit and finishing with a metallic arc weld. A few general observations will be made and then each material that is known to be weldable by the metallic arc process will be described briefly.

Clean surfaces are essential to the production of sound joints. Scale, oxide films, grease, dirt, paint or oil will interfere with the arc or contaminate the weld metal producing porosity or even lack of fusion. Mechanical, chemical and heat applications are suggested for good surface preparation and details of the methods that work best with each material are available from the manufacturer.

Besides cleanliness of surface other factors of joint preparation merit consideration. Careful alignment of parts will do much to insure the success of arc welded joints. Where hot shortness is a problem, parts should be set up to permit ample freedom of movement. Sometimes jigs and clamps are arranged to permit the parts to slide during the periods of expansion and contraction. Both butt and lap joints may be made although in many types of structures more success may be had with lap joints as these permit excellent fit-up as they may be pounded tight ahead of the welding operation.

Jigging and clamping of copper materials is highly recommended. Where light gage materials are being welded from one side only, backing blocks of copper will prove helpful. Such backing bars should be provided with a shallow groove to permit penetration of the weld metal through the joint. Good technique will lead to the establishment of a smooth, continuous bead on the underside of the weld. Sometimes heavy jigs are made of steel with a copper backing strip inserted in a steel bar for economical design.

Whereas welds in ferrous metals are frequently made from the ends of the joint towards the center, the opposite technique is preferred for copper and copper alloys. Welding is done from the center out. Where successive electrodes are applied, it is customary to strike the arc on the previously deposited metal and the puddle is established before welding through the crater left by the preceding electrode.

Six groups of copper metals may be fabricated by metallic arc welding. As outlined in Table I along with their compositions and approximate melting points, these are copper, deoxidized copper, bronze, copper-silicon alloys, cupro-nickel and aluminum bronze.

Table II reports the typical physical properties for the different groups. Most of the materials exhibit excellent ductilities and perform well under all of the forming operations used in connection with welding. Strengths, as compared with steel, are low. For this reason combination units using copper linings and steel structures are found in chem-

TABLE I

COMPOSITION AND MELTING POINTS OF COPPER AND COPPER ALLOYS WELDABLE BY THE METALLIC ARC PROCESS (COPPER CONTENT NOT SHOWN AS REMAINDER BESIDES ELEMENTS LISTED IS COPPER)

Group	Material	O_2	P	Si	Pb	Zn	Sn	Cd	Mn	Fe	Ni	Al	Melting Point °F.
A.	Copper; Tough pitch copper; Electrolytic copper; Lake Copper	0.03-0.07											1981
B.	Deoxidized copper		0-0.05	0-0.10									1981
C.	Bronze; Phosphor bronze; Gun metal; Bell metal; Bearing bronze		0.02-0.45		0-15	0-4	1-30	0-1.25					1418-1967
D.	Copper-silicon alloys; Everdur; Olympic metal; Herculoy; Tombasil; Duronze; PMG metal			0.25-5.0		0-5	0-2		0-1.50	0-2.5			1832-1981
E.	Cupro-nickel										2-30		2012-2237
F.	Aluminum bronze						0-2		0-1	0-4.5	0-5	1-14.5	1886-1967

THERE IS ONLY ONE SURE WAY TO TELL A GOOD *Bottleneck* FROM A BAD ONE

There are good bottlenecks and bad bottlenecks.

To form a perfect seal, the thread of a bottleneck and the mating thread of the closure must conform. By inspecting the thread contours of the bottlenecking mold and the closure, with a Jones & Lamson Optical Comparator, the accuracy of both is assured.

Forming Dies for plastic caps, and Seaming Rolls for metal cans are also inspected with Jones and Lamson Optical Comparators.

If your inspection department is a bad bottleneck, it will pay to investigate the possibilities of inspection by optical projection with Jones & Lamson Comparators. There is an experienced Jones & Lamson inspection engineer near you, ready to study your inspection problems—call, write or wire him without hesitation.

This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.

DID YOU KNOW... THAT GOLF BALLS MUST BE PERFECTLY ROUND TO BE TRUE? THEY ARE INSPECTED FOR CONCENTRICITY WITH **JONES & LAMSON** OPTICAL COMPARATORS

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

ical equipment where copper is desired for resistance to corrosion.

Five primary groups of arc welding electrodes are shown in Table III. Analyses differ slightly from those of the base metal but the changes are needed to make smooth flowing weld metal.

Table IV detail the different electrodes suggested for each of the basic groups of parent metal. It will be seen that there is a choice of three types for welding copper or deoxidized copper. But the use of dissimilar analyses may be harmful from a corrosion standpoint and this consideration ought to be investigated if an electrode of different analysis is to be selected. The strength figures given in Table IV are the highest to be attained if the ideal welding conditions prevail. Generally tensile values will be lower and specific figures may be obtained through the welding of test plates with the procedure to be used in actual fabrication.

Group A, Copper: Ordinary copper which includes oxygen bearing tough pitch copper, electrolytic copper and tough pitch lake copper contains a small amount of oxygen distributed throughout the metal as cuprous oxide. It is this oxygen that poses an extra problem in the weldability of copper besides that created by high heat conductivity of the metal. The oxygen has a definite weakening effect.

Both time and temperature influence the behavior of the cuprous oxide. The oxide migrates to the grain boundaries thereby making the metal both hot short and cold short. During contraction cracks may be formed. Metallic arc welding should be done at maximum current values with the speed of travel as great as the welder can accomplish. A technique of this type minimizes the harmful influences of temperature and time and brings about a satisfactory joint.

When Type I, deoxidized copper, welding electrodes are used, the coating of the electrode may be supplemented by the use of a small amount of brazing flux on the joint itself. This combination improves the strength, ductility and soundness of the weld deposit. With Type I electrodes all of the properties of the joint match closely those of the parent sheet.

Arc welding is usually restricted to sheet from 1/16 to 5/32-inch in thickness with the other welding processes being specified for thicknesses greater than these. Welding is done in the flat position only. Material ⅛-inch and thinner may be welded without a bevel employing a gap in the thicker material to secure penetration. Greater thicknesses are beveled 45 degrees to aid the welding operation. Backing pieces are quite essential for all gages.

Preheating to 500 to 600 degrees Fahr. before starting the weld is desirable. With direct current reverse polarity, copper electrodes thus far developed do not permit welding with alternating current, and a short arc good fusion will be assured after the plates are preheated. In heavier sections block welding is advisable since this technique confines the heat to the region being welded instead of dissipating the heat throughout the length of the seam as would be done with straight progression welding. Suggested current values are given in Table V. No spread is given although it should be remembered that the best welding conditions prevail when current and welding speeds are high.

When service requirements permit the use of weld metal of dissimilar analysis, phosphor bronze and silicon-copper electrodes can be used. The former are the more popular. They are used with direct current reverse polarity following the current conditions detailed in Table VI. Weld metal is stronger than that deposited by deoxidized copper electrodes.

Group B, Deoxidized Copper: Deoxidized copper which has been cleaned of cuprous oxide by refining with silicon, phosphorus and dissimilar deoxidizers is a much easier material to weld than those in Group A. There is, of course, no danger of a weakened structure in the heat affected zone because there can be no oxide migration to the grain boundaries. Although thermal conductivity is lower than that of the oxygen bearing types, it is still high enough to warrant all of the precautions outlined for ordinary copper. In general the welding procedures are identical with those already presented for Group A metals.

Group C, Bronze: In this group are found both cast and wrought materials practically all of which may be welded with Type II phosphor bronze electrodes. Once more high travel speeds are recommended, this time because the bronzes are especially hot short developing cracks when a large area becomes hot and cools slowly. Since the parent metal has insufficient phosphor for good weld metal deoxidation, the arc should be maintained on the weld metal keeping melting and fusion of the base metal to a minimum. Considerable improvement in bronze welding electrodes has taken place in the past several years and these compare quite favorably with carbon arc welding which for a long time was considered to be the best bet for bronze welds. Another use of the bronze electrodes, applications involving surfacing, was discussed in a preceding article (STEEL, Sept. 18, 1944).

Group D, Copper-Silicon Alloys: When the copper-silicon alloys are considered for welding most of the problems discussed in connection with the preceding materials are gone. Copper-silicon materials have reasonable instead of extremely high thermal conductivity. They are ductile and strong throughout the temperature range except for a short spread near the melting point. This hot short region can prove bothersome in rigidly fixed joints so these should be avoided when designs are being made.

There are six alloys in Group D: Everdur, Olympic Metal, Herculoy, Tombasil, Duronze and PMG Metal all of which are essentially alike in regard to copper and silicon contents but differing in other alloy constituents. Patent considerations are said to explain these minor variations in the third constituent which may be manganese, zinc, tin or iron. Welding qualities are substantially the

(*Please turn to Page 304*)

TABLE II
TYPICAL PHYSICAL PROPERTIES OF COPPER AND COPPER ALLOYS

Group	Material	Tensile Strength, psi Soft	Tensile Strength, psi Hard	Elongation % in 2 in.
A.	Copper	32,000	40- 67,000	35
B.	Deoxidized copper	35,000	40- 67,000	35
C.	Bronze	30-60,000	60-145,000	15-70
D.	Copper-silicon alloys	40-60,000	65-145,000	20-75
E.	Cupro-nickel	35-55,000	45- 90,000	30-50
F.	Aluminum bronze	40-85,000	50-125,000	40-70

TABLE III
COMPOSITION OF METALLIC ARC WELDING ELECTRODES FOR COPPER AND COPPER ALLOYS

Type	Material	P	Si	Ag	Sn	Mn	Zn	Fe	Ni	Al	Cu
I	Deoxidized copper	0-0.05	0-0.05	0-1	0-1						Balance
II	Phosphor bronze	0.05-0.45			1.5-10.5						Balance
III	Copper-silicon alloy		1-4		0-2	0-1.25	0-2	0-2.5			Balance
IV	Cupro-nickel					0.1-0.5			30		Balance
V	Aluminum bronze							0-4.5		5-14.5	Balance

TABLE IV
SUGGESTED ELECTRODE TYPES AND APPROXIMATE WELD METAL STRENGTHS FOR METALLIC ARC WELDING OF COPPER AND COPPER ALLOYS

Group	Base Metal	Electrode Type	Electrode Material	Approximate Maximum Weld Metal Tensile Strength, psi.
A	Copper	I	Deoxidized copper	26,000
		II	Phosphor bronze	38,000-60,000
		III	Silicon bronze	40,000-60,000
B	Deoxidized Copper	I	Deoxidized copper	35,000
		II	Phosphor bronze	38,000-60,000
		III	Silicon bronze	40,000-60,000
C	Bronze	II	Phosphor bronze	38,000-60,000
D	Copper-silicon alloys	III	Silicon bronze	40,000-60,000
E	Cupro-nickel	IV	Cupro-nickel	55,000
F	Aluminum bronze	V	Aluminum bronze	52,000-90,000

Chuck never did stop "scouting" —for you

IN civilian life Chuck worked hard for your Industrial Supply Distributor. Perhaps you didn't know it then—but many a time it was his hard, persistent scouting for scarce materials and supplies that helped you to keep your production going.

Then Chuck put on the Uniform—but he never did stop scouting for you. Today he is up there in the sky, but when it's over he will be back with your Industrial Supply Distributor —with new ideas for helping you still more.

Give your Distributor every opportunity to help you. Particularly nowadays, channel every order you possibly can through him instead of sending direct to the factory. Twenty orders to the Distributor can be cleared in *one* order to the factory—will be delivered in most cases from stock with less paper work and less congestion on overcrowded rail and trucking facilities.

For your own and *everybody's* benefit—

Telephone your I S D FIRST!

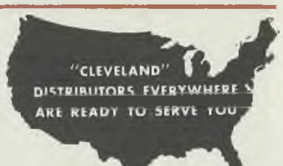
ARMY NAVY

ARMY E NAVY

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD. DETROIT · LONDON—E. P. BARRUS, LTD.—35-36-37 UPPER THAMES ST. E.C.4



Engineers Exchange Ideas On Steelmaking Practice

Papers presented at the fortieth meeting of the Association of Iron and Steel Engineers, William Penn hotel, Pittsburgh, Sept. 25-27, deal with miscellaneous blast furnace and steel plant operating problems and new developments for the postwar era

Fewer sizes of circuit breakers will be available in the future, F. W. Cramer, chairman, Crane Specification Committee, told members of the Association of Iron and Steel Engineers attending the annual meeting, William Penn hotel, Pittsburgh, Sept. 25-27. His committee at present is at work on the revision of standards for small air circuit breakers and for mercury arc rectifiers; study also is being given to laminated ladle hooks.

A preliminary report of the annual meeting including the announcement of a new mill for processing strip by a stretching operation, new officers for 1945, etc. was presented in last week's issue of STEEL, p. 36. Abstracts of various papers presented at the technical sessions follow:

Shearing Flat Rolled Steel, by F. E. Flynn, District Manager, Republic Steel Corp., Warren, O. and D. A. McArthur, Chief Engineer, Wean Engineering Co., Warren, O.: In connection with side trimming and slitting, it is important that a good setup be obtained, and good operating procedure be followed to obtain the best results.

It appears with proper equipment and operation, good results can be obtained on all classes and gages of material when power is applied to the knives, but on certain gages and classes of material equal, or nearly equal, results can be obtained by applying no power to the knives and pulling the material by means of the reel. If good results can be had in this manner the first cost of the equipment is less, and a less skillful operator can be used.

Setting the knives both as to vertical and horizontal clearance is also important, and must be varied for different gages and different types of material. In some materials the rotary knives are actually overlapped, and on the heavier materials do not meet each other.

Power requirements also vary depending upon the setting of the knives, but the prime consideration must be the quality of the cut edge.

Discussion brought out the fact that dulling the female knife of a tin plate shear gives a clean cut on the plate and a rough cut on the scrap. Also, chromium

(*Please turn to Page* 308)

(Left)—Kelly award being presented to A. J Fisher, fuel engineer, Bethlehem Steel Co., Sparrows Point, Md., by C. L. McGranahan, assistant general superintendent, Pittsburgh Works, Jones & Laughlin Steel Corp., Pittsburgh

(Below)—Six distinct secretaries of the Association of Iron and Steel Engineers. From left to right—H. C. Lindberg, Buffalo; A. L. Whitcomb, Chicago; W. W. Spanagel, Cleveland; E. F. Weiss, Detroit; L. O. Morrow, Philadelphia, and A. L. Lemon, Birmingham, Ala.

Model of Steel Plant Simplifies Construction Work

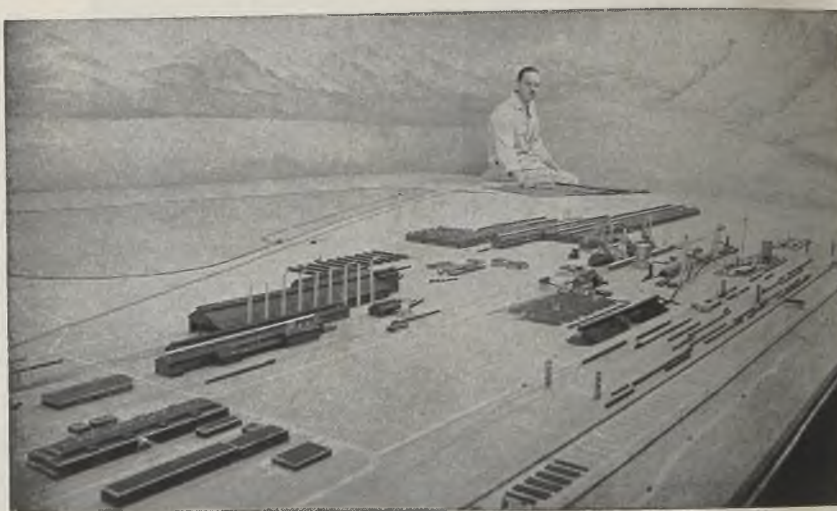
BLUEPRINTS and specifications were not the only guides used by construction officials and engineers in laying out and erecting Western America's largest steel mill at Geneva, Utah, which is now being operated for the Government by Geneva Steel Co., a U. S. Steel subsidiary. As a visual aid to engineers, officials and contractors, a precisely scaled model of the entire plant and ancillary facilities was built and housed in the engineering offices at the plant. According to M. B. Sheik, project manager, Columbia Steel Co., Defense Plant Division, this carefully scaled model built by G. O. Kohler of Chicago, proved valuable during construction.

Groups of engineers, supervisors, and contracting officials were called in to almost daily conferences to view the model so that they could obtain a visual picture of the entire layout of the plant. "There were so many things," said Mr. Sheik, "that could not have been visualized on blueprints, such as the location and layout of pipe lines, railroad trackage, roads, and so forth. It must be remembered that there were 99 major contractors involved in construction with as many as 63 of these working at one time in force on the job."

In making this model Mr. Kohler also scaled state highways and railroads running to the plant as well as possible entrances. On these roadways tiny precisely scaled automobiles and trains were built. When this was done, as a specific instance of the value of the model, construction officials and engineers discovered almost immediately that it was necessary to rearrange the flow of traffic. Additionally, the arrangement of the production facilities could be readily visualized long before the tremendous foundations were finished. James Farrell, construction engineer, Columbia Steel Co., Defense Plant Division, remarked that "it was much simpler and more satisfactory just to move structures around on the model in try-out sessions, than to have a lot of blueprints changed, redrawn and changed again".

"One of the major problems," said Mr. Sheik, "in the early stages of construction before buildings appeared above the ground, was the location of accessible and adequate storage yards for construction materials. With the help of the model of the Geneva Steel plant this problem was solved readily."

In addition to the model of the plant, Mr. Kohler made scaled models of the coal and iron mines and limestone quarry. These were all small enough to be housed in a room about 15 x 30 feet and yet they were large enough that the eye could readily locate even the smaller details of construction.



Precisely-scaled model of Geneva Steel Co's. plant Geneva, Utah. O. G. Kohler, builder of the model, is seated in the background

Automatic System Cuts Finishing Time on Mats

An automatic finishing system developed for painting steel landing mat sections for emergency airfields is adaptable without construction change for many peacetime jobs. It has finishing speeds from 400 to 600 sections (20 inches by 10 feet) per hour, degreased, dip-painted, baked, cooled, and loaded for shipping. The machine, built by Industrial Oven Engineering Co., Cleveland, consists of a continuous cross-bar conveyor carrying parts through the processes; a vapor degreaser, an agitated dip-tank; and 3-zone oven for continuous drying, baking and cooling. Automatic operation, including mechanical loaders and unloaders, cuts manpower requirements to a minimum.

Fuel is saved by a heavily insulated oven shell, maximum recirculation of oven atmosphere, and use of preheated air from the cooling zone as make-up air for the heating system. A paint tank exhaust system reduces fume hazard, and explosion-proof equipment assures safe operation at all times. Carry-over heat from the degreasing operation is used to control paint viscosity in the dip tank, which is agitated and equipped with dumping, draining and pumping equipment. Overhead construction conserves floor space.

Construction is all-steel. Conveyors now in use are 8 feet wide and will carry parts weighing 750 pounds. Each system is custom built, to assure maximum efficiency for individual needs, from standardized designs.

Volume of Practical Arc Welding Design Plates

Practical Design for Arc Welding, by Robert E. Kinkead, Vol. 1; cloth, 100 design plates, 8¾ x 11½ inches; published by Hobart Brothers Co., Troy 1, O., for $3.50, or $10 for complete three volume set.

This is the first of three volumes to be published by the Hobart Brothers Co., following publication of a number of the design plates in loose leaf form. It is a practical working book for the welder, manufacturer, engineer and designer. It is not a textbook but an illustrated storehouse and detailed drawings showing how tubing, plates, sheets, standard steel sections, angles and bars can be used in fabrication by arc welding at lower cost.

A complete work sheet is shown opposite each design plate, for notes, estimates and sketches, including a record form to aid application of design ideas to the user's own product. A cross reference index to short cuts to design ideas indicates the numbers of design plates that involve specific details common in many welding applications.

Electronic Recorders Released in Quantity

An electronic circular chart electric controller is announced by Brown Instrument Co., Philadelphia, division of Minneapolis-Honeywell Regulator Co. It is to be released without rationing. Features include a control point index in red similar to the black temperature pointer.

THREE CAUSES OF EYE FATIGUE IN WORKERS

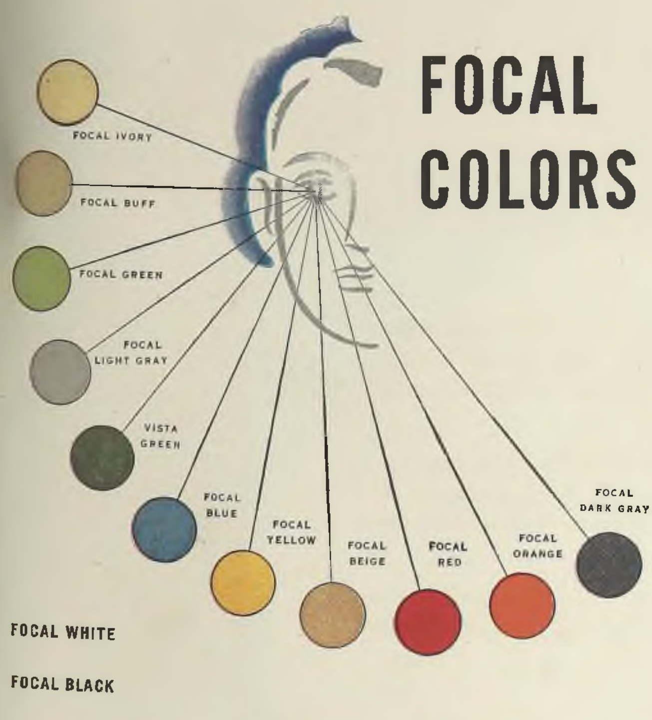
UNNECESSARY TRAVEL—Eyes have a habit of wandering. On a long monotone machine, the eye covers a great deal of unnecessary distance because there's nothing to hold it at one spot. Just as wasted steps tire out the body, so this needless travel which accomplishes nothing, tires out the eye.

TENSION—Hold out your arm, tensing the muscles. Notice how quickly they grow weary. The same thing happens to a worker's eyes when material he is fabricating is too similar in color to his machine. Wasted effort is required to differentiate between material and machine.

CONSTANT ADJUSTING—Go from a sunlit street into a moving-picture theater. For a minute you are so blind that you have difficulty finding a seat. A worker who glances up from a light-colored machine to a dark wall (or vice versa) has the same experience to a lesser degree.

COLOR DYNAMICS

Executives in many industries find this scientific system of using color minimizes workers' eye fatigue—builds up their morale —improves quality and quantity of production.



• No matter what type or color of material a given machine is processing, one of these focal colors will provide a satisfactory contrast with it. Applied to the operating parts of the machine, this focal color reduces strain, eye-fatigue and accidents.

THERE is a tendency to forget that people work not only with their hands, *but also with their eyes*—and that the seven muscles which operate the movements of the eyeball get tired just like arm or leg muscles.

This eye fatigue leads to headaches, "nerves", digestive upsets, and depression—eventually to absenteeism and lowered production. Therefore, one important objective of Color Dynamics is to do away with the causes of eye fatigue.

1. Unnecessary eye travel is minimized by painting the critical parts of the machine in a *focal color* which focuses the worker's attention exactly where he wants it to be.

2. Tension is reduced by choosing a focal color which affords a clear contrast between the machine itself and the material being fabricated.

3. Constant Adjusting is eliminated by painting walls in front of machines in "eye rest" colors.

• The practical value of Color Dynamics may be tested by applying these principles to one or two machines in your plant. For a comprehensive explanation of this new system of utilizing color-energy in industry, write for a free copy of our book, COLOR DYNAMICS, Pittsburgh Plate Glass Co., Paint Division, Dept. ST-10, Pittsburgh 22, Pa.

PITTSBURGH PAINTS

Pittsburgh Plate Glass Company, Pittsburgh, Pa.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

26TH NATIONAL METAL CONGRESS

CLEVELAND
OCTOBER 16-20, 1944

A CHANGE-OVER

MUST"...

"Cleaning and preserving of production equipment shall be accomplished with minimum delay after 'shut down'."

Army Service Forces Bulletin, P.S. No. 300

AS Government contracts are terminated, millions of dollars worth of idle Government and privately-owned machinery, precision tools, and other production equipment will have to be promptly protected against damaging rust for periods ranging from weeks to years.

That is why *Texaco Rustproof Compounds* and other Texaco rust preventives should be available for prompt use when change-over time arrives. These effective products meet Government specifications for exterior and interior application, and are available for immediate delivery. By ordering NOW you will eliminate possible last-minute delays and disappointments.

For exterior application, *Texaco Rustproof Compounds* provide penetrating, self-sealing films which are not only waterproof but highly resistant to chemicals and fumes. Easily applied with brush or spray gun, they remain soft, healing over any scratches and abrasions. *Texaco Rustproof Compounds* are long lasting and very economical.

In many cases where rusting already exists, costly chipping and scaling is eliminated because *Texaco Rustproof Compounds* penetrate and loosen the scale so thoroughly that removal is greatly facilitated.

Texaco Rustproof Compounds have proven highly successful in protecting all types of parts and equipment from weather and salt water in overseas shipments.

Texaco Lubrication Engineering Service and Texaco Products for *interior* and *exterior* rustproofing are available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd St., New York, 17, N. Y.

FREE! Send for this 36-page booklet today. Tells *how* Texaco Rustproof Compounds prevent rust, *where* and *how* to apply them and *why* they are so successful. A single suggestion in this booklet may save thousands of dollars.

Rustproofing Products

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

TOCCO ANNOUNCES

Two Major Developmen

THE WATER-COOLED MOTOR-GENERATOR

A radically new development now used in the larger TOCCO machines. Circulated water replaces forced air ventilation as a cooling medium for the motor-generator, affording TOCCO these revolutionary advantages:

TOTALLY ENCLOSED. Motor generator is hermetically-sealed against dust, dirt and grit. Minimizes wear and maintenance.

NO VIBRATION . . . NO NOISE. Anti-vibration mountings. No fan noise.

VERSATILE. Can be operated efficiently anywhere . . . even in hot, dirty forge shops and foundries.

See these new developments in operation at the National Metal Congress, Booth 3

THE OHIO CRANKSHAFT CO

Cleveland 1, Ohio

Induction Heating ★ ★ ★ ★

THE ELECTRONIC TOCCO MACHINE

Sets a new high standard in radio-frequency induction heating. A 20 K.W. unit for hardening, brazing, annealing or heating small parts . . . for hardening sharp contours such as cutting edges . . . for shallow surface-hardening. Advantages:

FASTER. Only electronic tube type induction heating unit with two work stations which can be set up for different jobs simultaneously for operation at same or different frequencies.

A PACKAGED UNIT. Completely self-contained in all metal cabinet. Floor area only 4′ 9″ x 4′ 3″. All sub-assemblies are easily accessible.

RUGGED PRODUCTION MACHINE. Power tubes and contactors are shock-mounted. Fully protected. No radio-frequency radiation. No high voltage hazards.

JUST PUSH A BUTTON

TOCCO

INDUCTION

HARDENING . . BRAZING

ANNEALING . . HEATING

DIECASTING DIGEST

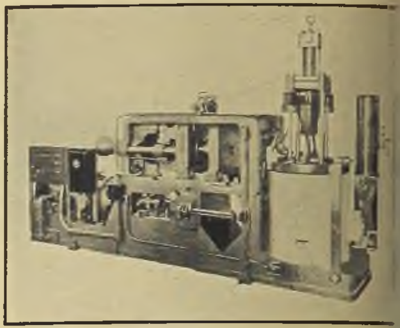
IV—Demand for better zinc die castings brings new machine

Anticipating demands for better zinc die castings at lower cost to compete with greatly improved (and cheaper) aluminum and iron castings, the Lester Engineering Company of Cleveland has developed a new high-speed die casting machine for zinc, tin and lead alloys which is said to be the fastest cycling commercial die casting machine ever built.

The new Model HHP-1 is a smaller adaptation of the big Lester-Phoenix HHP-3, embodying the features of the large machine at a lower price. It combines a cycling speed of 400 to 500 shots per hour (actual production; speed without load is 750 cycles per hour), with higher injection pressures than other zinc die casting machines of similar size and rating.

Outstanding features of the new ma chine are:

1. Its beam-type frame is a rigid on piece alloy steel casting with several tim the cross-sectional area and strength the usual bar-type frame. Dies a lowered through an opening in the t of the frame.



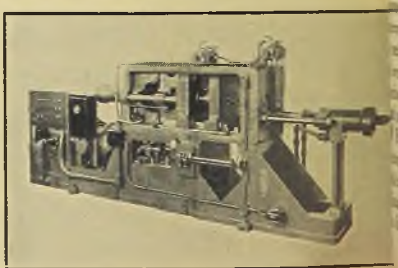
New machine for zinc alloys . . .

2. Extremely rapid die plate moveme is hydraulically actuated by double tog link mechanism fitted with over-siz pins.

3. Single die height adjustment by large centrally located Acme thread scre rotated by a single hand crank through worm and worm wheel. Die plates rema parallel at all times.

4. Molten metal is pumped at hi pressure into the die by a submerg plunger and gooseneck injection syste consisting of a nitrided alloy steel cylind a hydraulically actuated plunger wi cast iron piston rings, and a removab gooseneck and nozzle of heat a corrosion-resistant alloy castings.

Other features are an automatic h draulic ejector, cycle control by elect time clocks, provision for automa hydraulic core pulls, and safety contr which make injection impossible until



. . . convertible for aluminum.

is tightly closed. The machine is quick convertible for aluminum, brass or ma nesium die casting, the submerged plung and gooseneck injection system being r placed by a high-pressure cold chamb injection system. Castings are then mad by the slow-squeeze method of injectio permitting escape of air ahead of injecte metal. Pressures up to 20,000 psi a applied on the metal as it chills in the di preventing shrinkage voids and reducin entrapped air and gases to a no consequential minimum. This metho assures the production of strong, dens castings capable of passing X-ray in spection.

Space will not permit giving full detail of the new machine, but readers ma obtain literature and specifications b writing to Lester-Phoenix Inc., 262 Church Avenue, Cleveland 13, Ohio.

Announcing

COMPARE ACP

with your old electrodes

- *Easy slag removal.* Light porous slag permits quick removal with stroke of welding rod or light brushing . . . costs less on the job.
- *No sag in overhead welds.* Good flat beads . . . easy flow . . . that really stays put.
- *Easy arc control in all positions* . . . excellent physical properties.
- *Forceful direct arc* plus excellent metal transfer gives high penetration with complete fusion and easy manipulation.
- *High speed,* high burnoff rate.
- *All positions,* both a-c and d-c . . . welds are of highest ductility, impact resistance and x-ray quality.
- *Seven popular sizes:* diameters from 3/32" to 5/16".

WESTINGHOUSE
PRESENTS
John Charles Thomas

SUN. 2:30 EWT., NBC.
"Top of the Evening"
MON. WED. FRI. 10:15
EWT., BLUE NET.

the new ACP *electrode*

. . . FOR SPEED WELDING IN ALL POSITIONS WITH A-C AND D-C REVERSE POLARITY

One of the most important welding developments in the past ten years . . . *it's the new ACP welding rod . . .* engineered and produced to meet the operator's demands of today and postwar for versatile performance and ease of handling. This new Westinghouse electrode simplifies slag removal . . . steps up production and quality welds in all positions.

Flexarc ACP Electrodes form a *light, porous slag* which is easily removed from each pass by light brushing. Delays to allow weld to cool for heavy brushing are eliminated. Operators will immediately sense a drive and penetration equal to, or better than, that obtained with direct current and corresponding all-position, direct-current electrodes.

ACP electrodes are especially suited for shipyard, piping and heavy fabrication work. Complete information, including application data, physical properties, and current ranges, is featured in the new ACP electrode Booklet, B-3353. Learn more about ACP . . . write today for your copy. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N.

J-21310

WESTINGHOUSE FLEXARC ELECTRODES AVAILABLE FOR PROMPT DELIVERY

- **ACP—AWS—Class E-6010-11 . . . for high-quality work on mild steels that are not readily positioned. a-c and d-c reverse polarity.**
- **AP . . . Class E-6010 . . . for speed welding in all positions with d-c reverse polarity.**
- **SW . . . Class E-6012-13 . . . for low-current all-position welding on mild steels . . . particularly adapted for welding light gauge steel.**
- **FP . . . Class 6012-13 . . . for high-speed general-purpose welding on low or medium carbon steels.**
- **DH . . . Class E-6020-30 . . . for high-current downhand welding on low and medium carbon steels.**

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

WELDERS AND ELECTRODES

POSTWAR PROBLEM "SOLVERS"

Postwar conditions will doubtless be *new* conditions. Products that once sold well enough without much change may not meet the competition now being planned in thousands of plants. New designs and improved materials will be needed to please the future's critical buyers. Three able solutions to many postwar problems are offered here. Our engineers and chemists will gladly help you to apply them.

1 SEYMOUR NICKEL SILVER

An alloy of copper, nickel and zinc. Silvery white all through, it is the perfect base for silver, nickel and chromium plating. Having a fine, even grain, it is ideal for etched articles. Takes any hardness from dead soft to spring temper. Especially suitable for deep draws and difficult spinning. When leaded for free cutting, it is excellent for non-corrodible screw machine products.

2 SEYMOUR PHOSPHOR BRONZE

An alloy of copper, tin and phosphorus. Highly resistant to corrosion, abrasion, friction and fatigue. Practically indifferent to thermal change, it is a dependable material for small bearings. Produces springs that function indefinitely.

Seymour Phosphor Bronze is also made in welding rod, grades A, C and D. This is a fine, even melting rod that produces welds of high tensile strength. Your jobber can supply them.

3 SEYMOUR NICKEL ANODES

Made of virgin nickel under strict pyrometric control and laboratory check. Outstanding is the "Seycast" 99%+ cast nickel anode with radial "anchored" grains that practically eliminate loose nickel in low pH baths. Gives excellent results in any hot Watts bath having a pH of 4.5 electrometric or lower. Seymour line includes many other anodes of varying nickel content and grain structure . . . also Seymour Bright Nickel, a bath that produces a bright deposit on copper and brass, also direct on steel, that requires no coloring or buffing.

for the

PRODUCTION ENGINEER
PRODUCT DESIGNER
SPINNER & STAMPER
SCREW MACHINE SHOP
SPRING MAKER
ELECTRICAL MANUFACTURER
ELECTRO PLATER
SILVERSMITH
AND MANUFACTURERS OF
MUSICAL INSTRUMENTS
PRECISION INSTRUMENTS
JEWELRY
BAR EQUIPMENT
ARCHITECTURAL TRIM
ETCHED WARE, TAGS, Etc.

THE SEYMOUR MANUFACTURING CO., SEYMOUR, CONN., U.S.A.

SEYMOUR *Non-Ferrous Alloys* SINCE 1878


MESTA
80" FOUR-HIGH CONTINUOUS HOT STRIP MILL INSTALLED IN ONE OF THE WORLD'S LARGEST STEEL ROLLING PLANTS
MESTA MACHINE COMPANY · PITTSBURGH, PA.

HOW LIGHT, POWERFUL *Thor* Air Tools Speed Major Metal-Working Jobs!

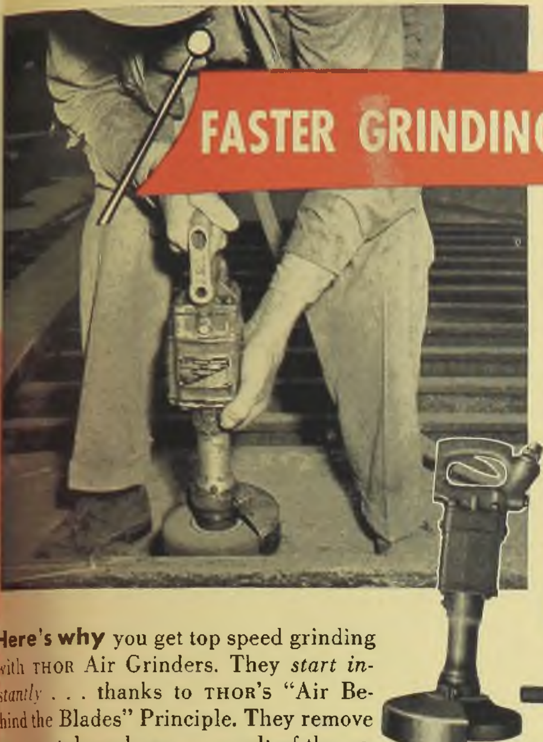
YOU can keep your production moving at an ever faster pace with THOR Air Tools. Basic reasons why THOR tools work harder and faster are shown in these typical examples of major shop and yard jobs. For helpful information on the complete line of THOR Air Tools write for Catalog No. 52B.

FASTER RIVETING!

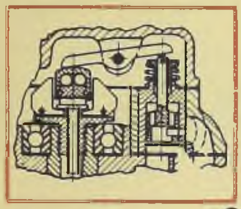
THOR Riveting Hammers give you everything needed for faster, easier riveting. 1. Special inlet ports in the air-tight, balanced poppet valve provide perfect throttle control for easy regulation of speed and blow. 2. The THOR Main Valve, precision-fitted to use effectively *all* the air, gives you hard-hitting, dependable power. Made *without* port holes which plug up or start cracks, it assures longer valve life, lower maintenance costs.

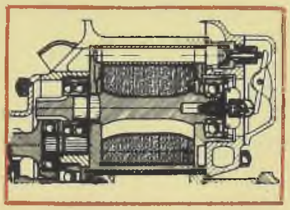
THOR Riveting Hammers are made in Standard and Heavy Duty types, in 4" to 9" strokes; with open, closed and inverted type handles.

Note the thick, substantial walls and the absence of port holes in the Thor Main Valve — to assure less valve breakage and lower maintenance. Inlet and Exhaust ports are separated by three different valve diameters to make air leakage and power-loss impossible.



Here's why you get top speed grinding with THOR Air Grinders. They *start instantly* . . . thanks to THOR'S "Air Behind the Blades" Principle. They remove more metal per hour . . . result of the extra power developed by the wider blades and deeper slots of THOR'S one piece rotor. And they maintain spindle speed at top efficiency . . . one function of THOR'S Safety Governor (in diagram). There are fifty different models of THOR Air Grinders for grinding, cleaning, buffing, and brushing.

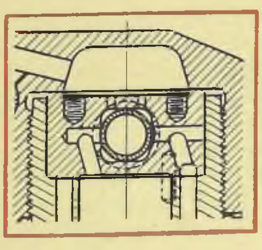




Every THOR Air Drill from the huskiest, big-capacity machines to the tiny, high-speed models, has the speed and stamina for today's three-shift schedules. THOR'S compact, one-piece construction of rotor and shaft (in diagram) provides deeper slots and wider blades — to deliver a steady flow of power. For faster handling, size and weight are cut to the minimum. These are but a few of the features you get in seventy-seven sizes of THOR Air Drills for every type of light and heavy duty drilling.

FASTER CHIPPING!

Positive valve action that insures a smooth flow of power . . . completely graduated throttle valve control . . . and vibration kept amazingly low — with these, THOR Chipping Hammers speed your work. You get easy starting with a light blow and complete control right up to full speed and power . . . to handle a full range of chipping. With THOR'S Cylinder Rocker Valve (in diagram) measured quantities of live air power both the forward and return strokes for exactly the right combination of speed and smoothness. Available also in Plate and Spool Valve types, THOR Chipping Hammers offer a full range of sizes, with ¾" to 4" strokes, open or closed style handles — a hammer for every job!



THOR AIR TOOLS FOR EVERY JOB

- RIVETING HAMMERS • CHIPPING HAMMERS
- SCALING HAMMERS • DRILLS • GRINDERS
- SAWS • SUMP PUMPS • BALANCERS
- HOISTS • SCREW DRIVERS • WRENCHES

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

all set for T.N.T.

POWERFUL TNT, for which endless rows of bomb cases are waiting, looks and pours in a thick, yellow stream . . . a deadly, 1000-lb. "yolk" for each of these bomber "eggs".

Machining operations in the manufacture of munitions range from rough hogging of steel to delicate jobs of watchmaker precision, as on fuses. In all of them, Texaco Cutting and Soluble Oils assure faster machining, longer tool life.

Texaco Cutting Oils, for instance, permit higher speeds and feeds, with improved surface finish. They lubricate the tools, and by carrying away the heat prevent chip welding; thus lengthening tool life, assuring greater output.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed at the right.

The services of a Texaco Engineer, specializing in cutting coolants, are available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ *More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.*

★ *More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.*

★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

★ *More locomotives and railroad cars in the U. S. are lubricated with Teaxco than with any other brand.*

★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

TEXACO REG. T. M.

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

A SPECIAL REPORT TO INDUSTRY ON

Postwar Uses of Metals

. . . Plus a preview of the activities of the American Society for Metals, American Welding Society, Institute of Metals and the Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers, American Industrial Radium and X-Ray Society and the Society for Experimental Stress Analysis . . . And a list of exhibitors at the 26th National Metal Congress and War Conference Display; Cleveland, October 16-20, 1944

CONTENTS OF THIS SECTION

Postwar Uses of Metals:

At the Metal Congress:

Metals in Peacetim

PROBABLY no subject holds more interest currently in the metal producing and metal consuming industries than the possible shifts which may take place in the applications for engineering materials when production of civilian products again is resumed.

As far as the production front is concerned, the war in effect has been one of substitutions occasioned by war equipment requirements of the moment and the relative scarcity of the materials at the same time. A half dozen substitutions for the same application have not been at all uncommon. Entirely familiar to those engaged in metalworking have been the substitution of wood and plastics for metals; steel for aluminum and, more recently, aluminum for steel; secondary aluminum for zinc in die castings and composite stampings for forgings, to name only a few.

Lack of alloying elements such as nickel, vanadium, molybdenum and chromium resulted in many shifts and reshifting in the types of alloy steels specified for a given application. In many cases, it was found advisable to switch back to the original specification as the substitutes themselves became scarcer.

Many of the substitutions already have proved to be pure makeshifts, such as the use of timber in place of structural shapes and plates in construction work. However, other substitutions will leave a permanent mark for all time. Part of this may be attributed to improvements in fabricating techniques and a substantial share of the balance simply to an awakening on the part of plant engineers to the possibilities offered by materials with which they were relatively inexperienced.

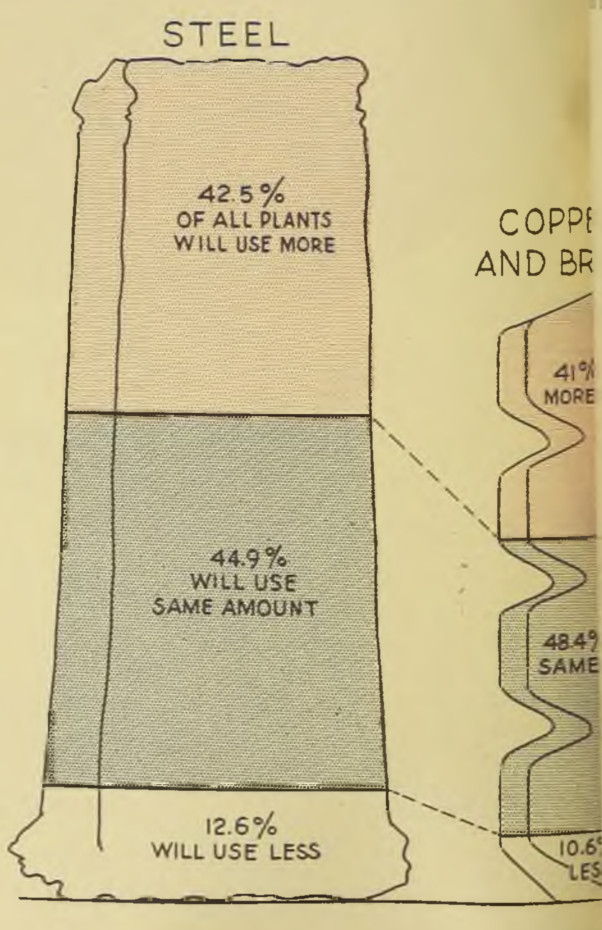
As a means of obtaining a more tangible clue as to what the future holds for metals, the editors of STEEL consulted a substantial cross section of the plants in the consuming field. These users of materials were asked whether they planned to use relatively more steel, copper and brass, aluminum, plastics and magnesium; how they felt about national emergency steels; whether they would use more castings, stampings, forgings and die castings; whether they would do more subcontracting; whether more special shapes would be helpful in fabricating their products; whether specification of materials on performance would be preferable to dependence wholly on chemical analysis, and finally about their plans for postwar products and expectations on employment.

In making the study covering 1922 plants from coast-to-coast, STEEL's editors were careful to maintain an equitable balance as to size of plant and type of products normally produced, so that the findings set forth on the following pages may be regarded as closely representative for the entire metalworking industry. In all of the data presented, it is important to note that no attempt is made to show how much of each material will be used but simply the shifts which are likely to take place in the course of events.

Because of the necessity for making the study as lea cumbersome as possible, some of the engineering materia which have assumed increasing importance during tl war were not considered, these including plywood ai glass and the minor metals. Lead and zinc also we eliminated for the reason that the trends in these tv major metals may be observed by studying the develo ments in copper alloys, steel and die castings, with whi they are closely associated.

Of the five basic materials covered, steel, copper ai brass, aluminum, plastics and magnesium, it will not at all surprising to note that steel is consumed by 9 per cent of all plants. Copper and brass follows with 6 per cent with aluminum crowding closely behind with percentage of 63.6. Plastics are used by less than h of all companies, or specifically 45.2 per cent. Magnesiu which had been available only in relatively small to nage prior to the war, now is used by 29 per cent of plants.

The accompanying chart indicates pictorially the pla using the several materials and the likely trend in co sumption. The height of the symbols bears no relation tonnage consumed but simply to the numbers using ea material. In considering the percentage figures present in this survey, the relative amounts of each material ava



Products

Metalworking plants expect to expand use of steel, aluminum, copper and brass and magnesium. Sharp gain likewise is indicated for plastics

hle should be kept in mind. Plastics, as an example, omprise only a fraction of 1 per cent of the steel suply. In an earlier study (STEEL, Jan. 3, 1944), producion capacities were shown as follows:

	Net Tons
Steel	96,000,000
Copper	1,500,000
Aluminum	1,200,000
Magnesium	300,000
Plastics	200,000

With possibly the exception of plastics, these capacity figures may prove to be somewhat exaggerated after a final accounting is made for obsolescence and cancelled expansion plans. In the steel industry, some plants resurrected for the duration undoubtedly will prove to be uneconomical under peacetime competitive conditions and others will not be completed. Capacity figures applying o the nonferrous metals also are scheduled for downward evisions when obsolete and high cost plants built with government money ultimately are clipped from the list.

Wherever capacities for the production of various engineering materials eventually settle, the fact remains that all will enjoy fairly substantial markets, especially in the years ahead which will be required to satisfy consumer demand built up over the last 4 or 5 years. In performing this service, more than three-fourths of the metalworking plants look optimistically ahead to hiring more workers or at least maintain present employment.

Among the metals, the largest percentage increase appears to be in prospect for aluminum with 58.3 per cent of the plants already using this versatile metal planning to use more, 31.2 per cent the same amount and 10.5 per cent less. Magnesium, which emerged as one of the "must" metals of the war, is due for still further growth but not to the same extent as aluminum. Thirty-five per cent of the plants using magnesium plan to use more, 50 per cent will make no change while 15 per cent will use less. The latter probably reflects anticipated cancellation of war contracts and the entire picture in all likelihood will change when more is learned about the fabrication of this extremely light metal.

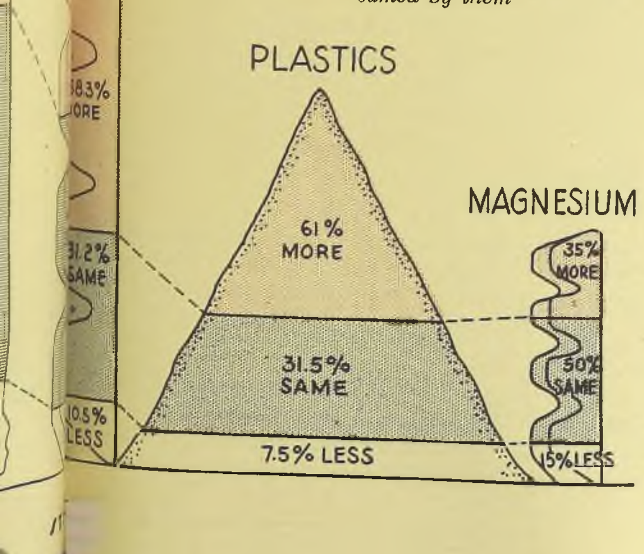
Steel remains in an enviable position, although the percentage loss indicated is slightly larger than for copper and brass and aluminum but smaller than for magnesium. Steel is purchased by nearly 96 per cent of the metalworking industry, and, of those buying it, 42.5 per cent plan to use more, while 44.9 per cent will use about the same tonnage and 12.6 per cent will use somewhat less.

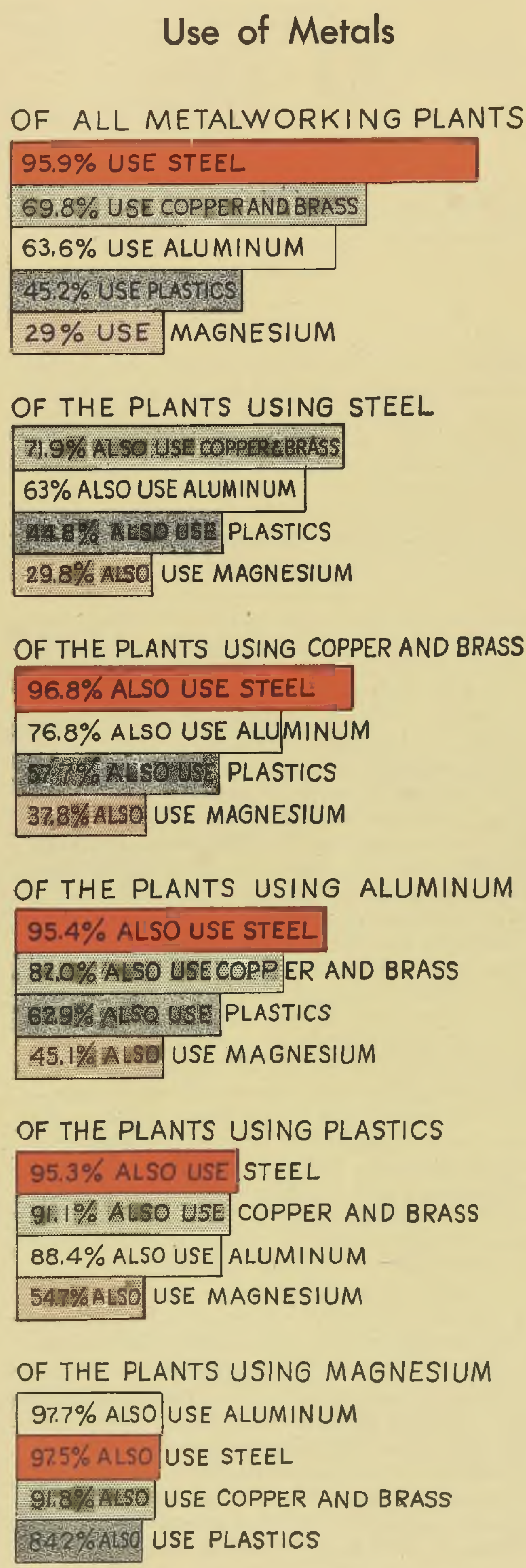
The figures indicate that copper and brass are in relatively the same position as steel marketwise, although the former may be regarded as having a slight edge when only percentages are considered. Forty-one per cent of the plants using copper and brass will use more, 48.4 per cent the same amount and 10.6 per cent less. The market for copper and brass will not expand quite as much as for steel but its current customer list will hold slightly better. Numerically, steel remains in the forefront since it does business with 96 per cent of the entire metalworking industry compared with 69.8 per cent for copper and brass and 63.6 for aluminum.

Plastics have been blessed with a large measure of popular interest in the past few years and considerable significance may be attached to the place these materials have assumed in the metalworking field. Although only 45.2 per cent of the 1922 plants reporting to STEEL use plastics alone or in conjunction with metals, a larger percentage growth is indicated than for steel, copper and

Use of Metals

Adjoining chart is based upon data submitted to STEEL by 1922 plants, of which 95.9 per cent use steel, 69.8 per cent copper and brass, 63.6 per cent aluminum, 45.2 per cent plastics and 29 per cent magnesium. Heights of the symbols for each material indicate relative numbers of users and bear no relationship to tonnage consumed by them





brass, and aluminum or magnesium. Sixty-one per cent of the plants already using plastics plan to use more, 31.5 per cent will use the same amount and only 7.5 per cent will use less. Further reference to the chart will reveal that the percentage loss is the least for any of the five materials.

Further light on the competitive situation between plastics and the metals may be obtained by studying the chart on use of metals. As might be expected, plastics are least competitive with steel while magnesium is at the top of the list with copper and brass and aluminum in between. Only 44.8 per cent of the plants using steel also use plastics, while the respective percentages for copper and brass, aluminum and magnesium are 57.7, 62.9 and 84.2. While competing especially with the metals readily adapted to sand and die casting, plastics are complementary to metals in many applications for ornamental trim and for molding over metal inserts.

Other significant points are set forth in the chart on use of metals. For instance, it may be noted that 97.7 per cent of the plants using magnesium also use aluminum but of the plants reporting the use of aluminum only 45.1 per cent also use magnesium. This may be interpreted as meaning that magnesium is finding use in plants which originally fabricated aluminum. A similar deduction may be determined in the case of steel and magnesium, since 29.8 per cent of the plants using steel also use magnesium but of the plants using magnesium 97.5 per cent also use steel.

The almost universal use of steel shown by the overall figures is reconfirmed by the chart breakdowns. Of the plants using copper and brass, 96.8 per cent also use steel; of plants using aluminum, the proportion using steel is 95.4 per cent and of plants using plastics, the proportion is 95.3 per cent. Copper and brass finds the most favor among plants using steel, the percentage being 71.9 per cent, compared with 63 per cent for aluminum, 44.8 per cent for plastics and 29.8 per cent for magnesium.

A study of the relative acceptance of the metals and plastics among various employment groups by means of the chart on page 163 reveals that the very large plants will expand their use of steel to a smaller degree than the medium-size and very small plants. In addition, a considerable proportion of those planning to use less steel are concentrated among companies employing from 250 upwards. Less importance may be attached to this when it is considered that many of the larger corporations have been busy on war work which involved the consumption of extremely large tonnages of steel, leaving little room for further expansion. As will be shown later, the largest relative gains in steel consumption may be expected among plants which were diverted from the manufacture of items which are essentially of a civilian character.

Among the plants employing over 1000 workers 35.6

(Left)—Chart indicates types of materials used by metalworking plants and their interrelationships. For instance, plants reporting use of steel consume relatively less aluminum than those employing copper and brass

(Opposite page)—Considerable significance may be attached to this chart indicating trends in use of materials by various employment groups. Note that larger increases in consumption of some materials may be expected among medium-size and smaller companies

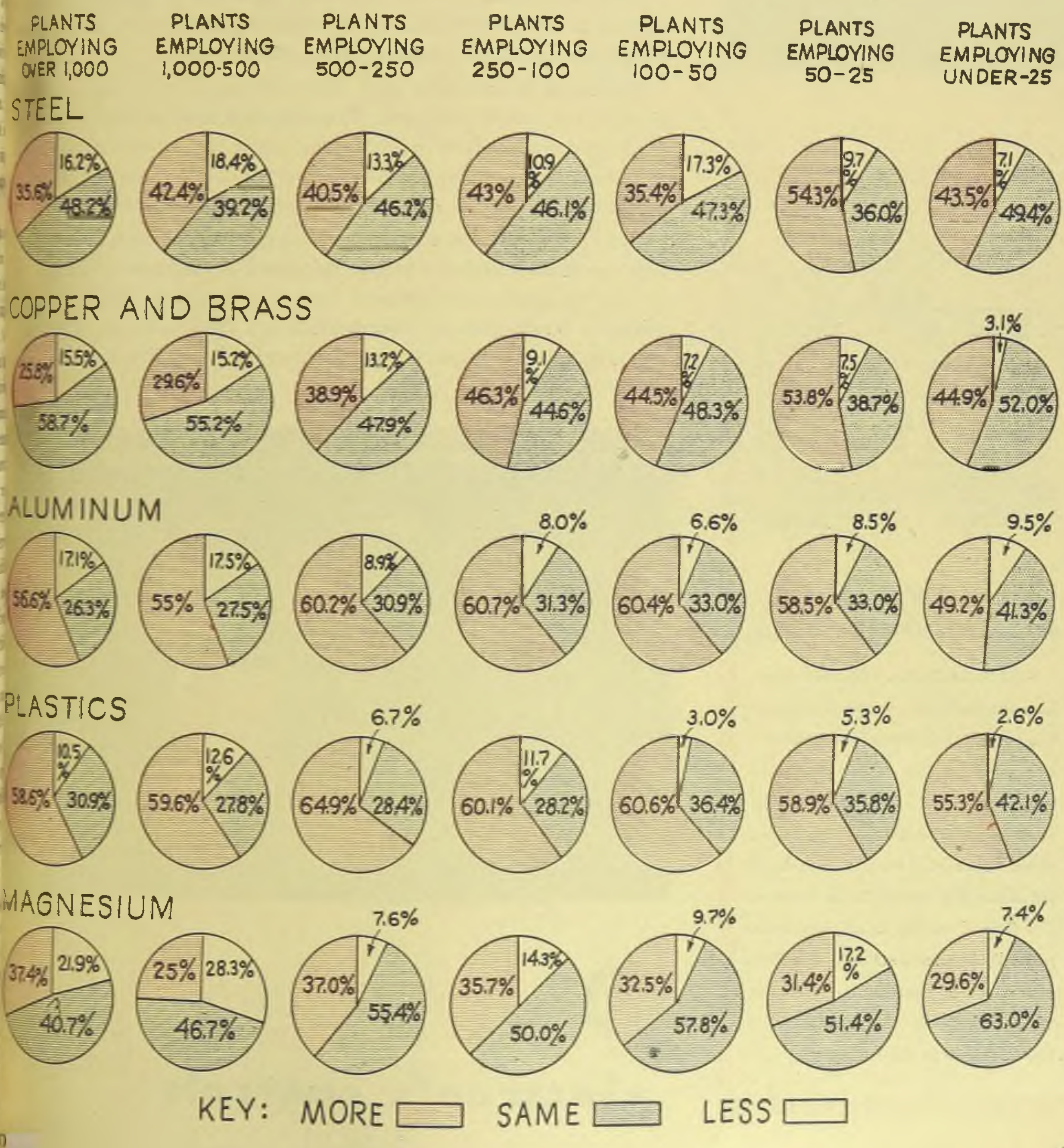
er cent plan to use more steel, 48.2 per cent the same mount and 16.2 per cent less. In the 1000-500 group ie proportion expecting to use more steel is slightly igher at 42.4 per cent, while the smaller number or 9.2 per cent will use the same tonnage and 18.4 per cent ill use less. A better showing is made by the 500-250 roup, of which 40.5 per cent will use more steel, 46.2 er cent the same amount and 13.3 per cent less. Further reference to the chart indicates that a progressively etter showing is made by the smaller plant groups with ie exception of those employing 100 to 50. Among the ery small establishments with less than 25 men, only 7.1 er cent will use less steel.

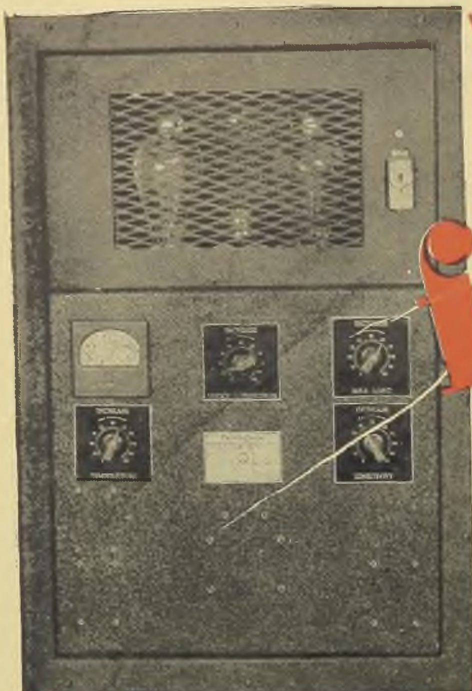
While the future for copper and brass may be regarded ptimistically, the industry can look for the largest perentage increases in consumption among the plants emloving less than 250 workers. In plants with over 1000 men, only 25.8 per cent expect to increase their purchases, this being the smallest gain registered for any of the five materials in this group.

The aluminum picture is somewhat different. The largest losses are concentrated among the two groups of plants employing 500 men and over, undoubtedly as a reflection of the cutbacks in aircraft production.

For those interested in detailed marketing information, the large table on page 165 will provide the basis for considerable study. It will be observed that figures are presented for 36 types of metal consuming plants, including the percentages using each material and an indication of future buying tendencies. Every plant in 16 of these classifications uses steel in one form or other and most of the figures are in the high nineties. All plants in one group, makers of office equipment, use copper and brass.

Prospective Use of Metals by Employment Groups





furnatron*

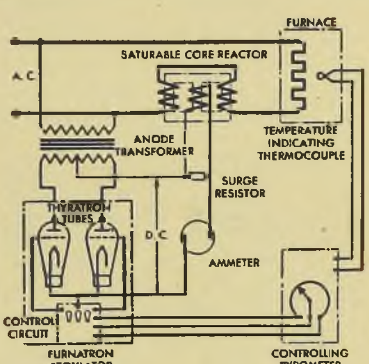
FOR ACCURATE AUTOMATIC FURNACE CONTRO

The answer to fluctuating temperatures in resistance-type electri furnaces is provided by the new Westinghouse-developed electro device—Furnatron*. This regulator operates to provide accur control of the alternating current reaching the furnace, and is equa adaptable for single-phase or three-phase systems.

Furnatron is available as a separate regulator or as a compl control unit, panel mounted. The complete unit normally consists the Furnatron regulator, a controlling pyrometer, control switches, a in certain cases, an anode transformer. If desired, meters to indic the power flowing into the furnace can be incorporated in the pa

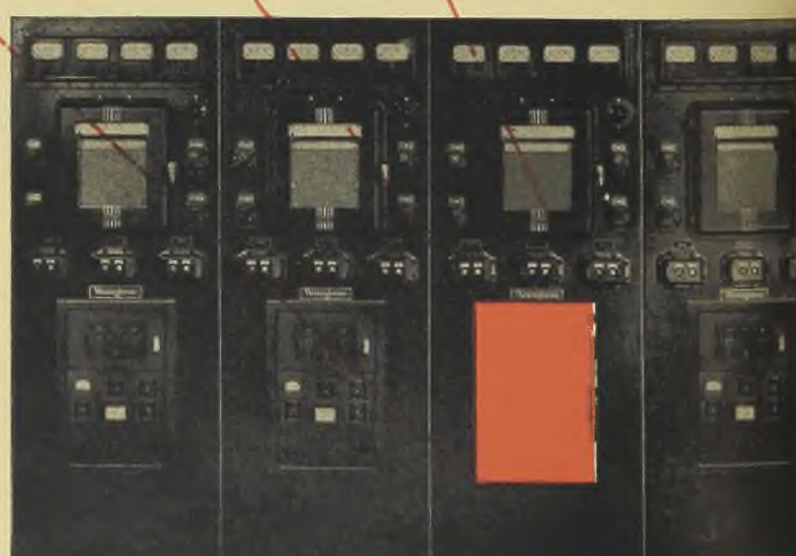
The Furnatron system of controlling the furnace temperature is most accurate available today. Its speed of response is limited o by the pyrometer and furnace itself. For complete details, call y nearest Westinghouse representative. Westinghouse Electric Manufacturing Company, East Pittsburgh, Pennsylvania. J-6

*Trade-Mark Registered



HOW THE FURNATRON WORKS

Fundamentally, the Furnatron regulator automatically controls the saturation current of a saturable core reactor connected in the furnace element supply line. The Furnatron functions as an electric rectifier, to supply d-c power to reactor core, and thereby adjust the line voltage to the furnace. The flow of current is adjusted automatically, in accordance with the indications of a controlling pyrometer which operates in conjunction with a thermocouple in the furnace.



Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

electronic controls

Present and Prospective Use of Metals By Various Consumer Groups

CLASSIFICATION	STEEL				COPPER and BRASS				ALUMINUM				PLASTICS				MAGNESIUM			
	% Of All Plants Using	Will Use More	Will Use Same Amount	Will Use Less	% Of All Plants Using	Will Use More	Will Use Same Amount	Will Use Less	% Of All Plants Using	Will Use More	Will Use Same Amount	Will Use Less	% Of All Plants Using	Will Use More	Will Use Same Amount	Will Use Less	% Of All Plants Using	Will Use More	Will Use Same Amount	Will Use Less
Bar Products—Bolts, Nuts, Rivets, Screw Machine Products	98.6	35.7	52.1	12.2	58.1	32.6	53.5	13.9	48.6	47.2	30.5	22.3	16.2	50.0	50.0	0	16.2	41.7	41.7	16.6
Wire Products—Wire Specialties, Cable, Wire Fabric	96.6	64.3	32.1	3.6	55.2	71.9	21.9	6.2	41.4	66.7	29.2	4.1	25.9	73.3	20.0	6.7	8.6	0	100.0	0
Sheet and Strip Products—Light Gage Tubing, Stampings	96.6	52.4	38.1	9.5	66.7	47.4	40.6	12.0	61.5	58.9	30.0	11.1	33.4	63.8	29.3	6.9	16.7	34.5	44.8	20.7
Plate Fabricators—Including Welded Pipe	97.4	40.6	47.3	12.1	65.8	50.0	46.0	4.0	50.0	55.3	39.4	5.3	28.9	45.5	40.9	13.6	17.1	23.0	69.2	7.8
Structural Fabricators	100.0	42.1	43.9	14.0	48.3	32.1	50.0	17.9	53.4	54.8	35.5	9.7	29.3	35.3	41.2	23.5	17.2	10.0	60.0	30.0
Ornamental and Wrought Iron Fabricators	96.4	48.1	40.7	11.2	57.1	50.0	37.5	12.5	60.7	52.9	47.1	0	35.7	50.0	40.0	10.0	28.6	37.5	62.5	0
Job Galvanizing, Plating, Heat Treating and Welding	100.0	55.6	33.3	11.1	48.1	30.8	46.2	23.0	33.4	33.3	44.5	22.2	29.6	50.0	25.0	25.0	14.8	25.0	50.0	25.0
Jobbing Machine, Repair Shops	95.4	51.6	38.7	9.7	78.5	43.1	39.2	17.7	69.2	46.7	40.0	13.3	49.2	71.9	18.8	9.3	40.0	34.6	46.2	19.2
Dies and Molds—for Stamping, Forging and Plastics	89.8	38.7	47.7	13.6	73.5	58.3	41.7	0	65.3	56.3	28.1	15.6	44.9	68.2	27.3	4.5	26.5	15.4	69.2	15.4
Building Hardware and Trim—Prefabricated Buildings	96.3	61.0	32.5	6.5	70.0	50.0	42.9	7.1	72.5	65.5	24.1	10.4	38.8	54.8	32.3	12.9	20.0	18.8	56.2	25.0
Heating, Ventilating and Air-Conditioning Equipment	100.0	61.0	29.9	9.1	77.4	47.7	43.1	9.2	71.4	65.0	26.7	8.3	50.0	64.3	28.6	7.1	25.0	28.6	42.8	28.6
Metal Furniture—Cabinets, Kitchen Equipment	92.5	51.4	35.1	13.5	67.5	51.9	37.0	11.1	70.0	69.6	23.2	7.2	55.0	63.6	31.8	4.6	20.0	18.9	62.5	18.6
Containers and Hollow-Ware—Light Pressure Vessels	95.1	57.1	29.9	13.0	69.1	42.9	46.4	10.7	51.8	59.5	33.3	7.2	43.2	60.0	31.4	8.6	18.5	20.0	66.7	13.3
Light Metal Products—Specialties, Light Hardware	96.7	49.3	30.6	20.1	73.8	56.6	32.1	11.3	67.1	71.0	19.0	10.0	53.7	75.0	12.5	12.5	26.8	37.5	30.0	32.5
Plate Products—Boilers, Processing Equipment, Stokers	100.0	55.4	33.8	10.8	65.7	47.7	40.9	11.4	62.7	54.8	40.5	4.7	44.8	43.3	50.0	6.7	35.8	16.7	66.6	16.7
Locomotives, Cars, Ships	100.0	24.3	42.4	33.3	82.4	25.0	57.1	17.9	76.4	38.5	38.5	23.0	50.0	35.3	35.3	29.4	41.2	7.1	50.0	42.9
Metallurgical and Industrial Furnaces	100.0	20.0	75.0	5.0	75.0	27.8	72.2	0	79.2	57.9	42.1	0	58.3	71.4	28.6	0	25.0	16.6	83.4	0
Aircraft Accessories and Parts	93.9	51.6	40.3	8.1	72.7	47.9	37.5	14.6	66.7	68.2	25.0	6.8	48.5	62.5	34.4	3.1	33.4	31.8	50.0	18.2
Parts—Auto and Machine	96.1	43.3	44.9	11.8	68.1	37.7	52.6	9.7	59.9	57.8	31.2	11.0	46.3	61.3	31.9	6.8	35.4	33.0	49.9	17.1
Auto Truck Bodies and Trailers	100.0	39.0	46.3	14.7	64.3	33.3	63.0	3.7	59.5	68.0	28.0	4.0	50.0	57.1	38.1	4.8	19.0	25.0	62.5	12.5
Small Tools—Cutlery and Flatware	98.2	40.1	47.9	12.0	62.4	43.4	49.1	7.5	48.2	51.2	36.6	12.2	41.2	64.3	27.1	8.6	28.8	40.8	44.9	14.3
Plumbers' Supplies—Steam Specialties, Valves	88.9	45.3	39.1	15.6	86.1	40.3	46.8	12.9	61.1	50.0	34.1	15.9	47.2	70.6	23.5	5.9	27.8	35.0	45.0	20.0
Agricultural Implements	100.0	14.4	20.4	65.2	70.0	42.9	45.7	11.4	58.0	58.6	27.6	13.8	58.0	69.0	20.7	10.3	36.0	27.8	50.0	22.2
Contractors' Equipment	100.0	47.0	50.0	3.0	70.1	27.7	61.7	10.6	55.2	45.9	45.9	8.2	32.8	50.0	45.5	4.5	26.9	16.7	61.1	22.2
Automobiles, Trucks, Tractors	100.0	29.0	54.9	16.1	90.3	17.9	64.3	17.8	77.4	41.6	50.0	8.4	70.9	72.7	27.3	0	54.8	47.1	47.0	5.9
Electrical Equipment—Industrial, including Motors	93.4	33.8	48.6	17.6	89.9	42.3	46.5	11.2	78.5	69.4	21.0	9.6	70.9	73.2	23.2	3.6	35.4	46.4	46.4	7.2
Electrical Appliances and Assemblies	94.3	36.4	48.5	15.1	88.6	29.0	58.0	13.0	97.1	73.5	17.6	8.9	94.3	60.6	33.3	6.1	34.3	33.3	50.0	16.7
Materials Handling Equipment	100.0	43.3	46.3	10.4	76.1	27.8	64.8	7.4	71.8	58.9	35.3	5.8	49.3	51.4	37.1	11.5	36.6	42.3	46.2	11.5
Engines, Pumps, Compressors and Hydraulic Equipment	100.0	43.7	42.5	13.8	86.8	36.7	50.6	12.7	75.8	56.5	31.9	11.6	46.2	52.4	38.1	9.5	39.6	30.6	61.1	8.3
Heavy Machinery	100.0	37.5	56.2	6.3	81.6	27.5	70.0	2.5	69.4	35.2	59.0	5.8	44.9	31.8	59.1	9.1	44.9	22.7	72.8	4.5
Special Machinery	96.5	44.5	45.4	10.1	81.4	40.2	51.6	8.2	79.6	56.1	34.4	9.5	50.9	60.0	33.0	7.0	35.4	31.3	51.3	17.4
Metalworking Machinery	100.0	24.0	72.0	4.0	80.0	20.0	75.0	5.0	72.0	33.3	55.6	11.1	40.0	20.0	80.0	0	44.0	27.3	63.6	9.1
Machine Tools	100.0	25.0	65.0	10.0	96.3	21.5	55.7	22.8	78.0	48.4	39.1	12.5	56.1	50.0	41.3	8.7	32.9	25.9	63.0	11.1
Machine Tool Accessories—Tools, Dies, Jigs, Fixtures	97.3	31.0	57.7	11.3	60.3	22.7	67.3	10.0	58.9	41.9	46.5	11.6	36.9	51.9	40.7	7.4	32.9	33.3	37.5	29.2
Instruments—Time and Recording	94.7	26.7	55.6	17.7	89.5	33.8	55.9	10.3	86.8	69.7	21.2	9.1	82.9	68.3	25.4	6.3	46.1	51.4	40.0	8.6
Office Machinery—Typewriters and Calculating Machines	100.0	35.7	50.0	14.3	100.0	35.7	42.9	21.4	92.8	69.2	23.1	7.7	92.8	76.9	23.1	0	50.0	57.1	42.9	0
Average All Plants	**95.9**	**42.5**	**44.9**	**12.6**	**69.8**	**41.0**	**48.4**	**10.6**	**63.6**	**58.3**	**31.2**	**10.5**	**45.2**	**61.0**	**31.5**	**7.5**	**29.0**	**35.0**	**50.0**	**15.0**

National Emergency Steels

Lean alloy types are here to stay with 68.3 per cent of metalworking plants likely to use them after the war. High alloy steels remain in favorable position with use indicated by 92.2 per cent

FEW would have thought a few years ago that the war would give birth to a brand new series of steels which would find a permanent place in the peace to follow. Even 3 short years ago, when the Committee on Manufacturing Problems of the American Iron and Steel Institute drew up a list of steels to replace the high nickel steels as nickel supplies became short, would very many venture to predict that dozens of new, lean alloy emergency combinations shortly would be here to stay.

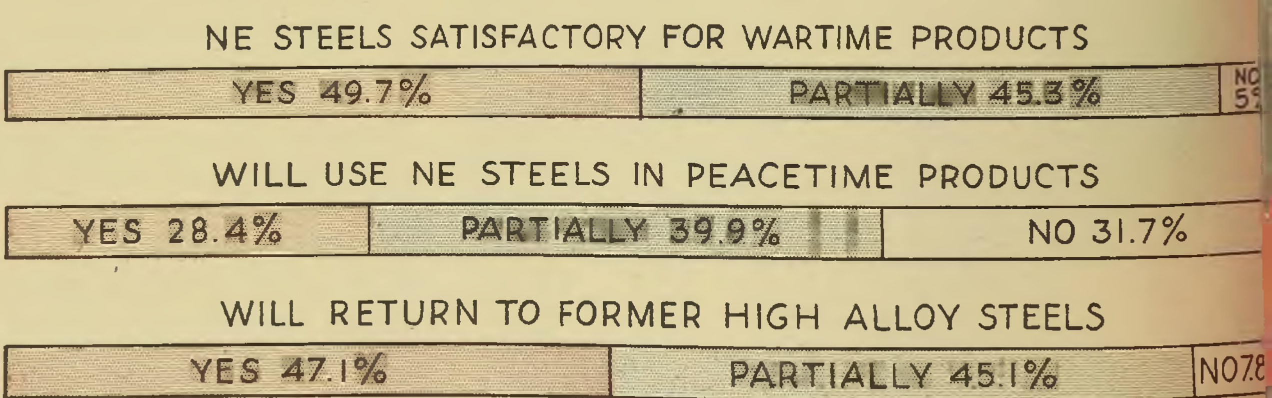
While the United States has adequate supplies of iron ore, coal and limestone for many years to come, it must look to outside sources for the ingredients with which to make alloy steels. Out of nickel, chromium, cobalt, manganese, tungsten, vanadium and molybdenum, only the latter is found in abundant quantities in this country. Wartime emergency brought in the production of some of the elements from low-grade deposits but peacetime operations are practically out of the question without government subsidies.

The shortage of nickel in 1941 proved to be only a starter on the long list of scarcities to come. Chromium shortly thereafter was added to the list, only to be followed by vanadium, tungsten, cobalt and mangane Molybdenum, which was used as a substitute for otl elements, in turn became scarce and further adjustmei in alloy steel constituents were made necessary.

The original allowances for nickel and chromium we 0.50 per cent each for the early emergency steels work out by American Iron and Steel Institute and Society Automotive Engineers' committees at the instigation the War Production Board. Initial work covered thi basic types, carbon-molybdenum, manganese-molybden and chromium-nickel-molybdenum. The attempt v made to design specifications for these three series of ste in required carbon ranges so that an alternate could selected to match the properties of each of the alloy ste previously used.

In September, 1942, for the purpose of relieving scarcity of molybdenum, it was decided to eliminate s eral of the manganese-molybdenum grades and the 94 9500 and 9600 series were released. Of course, purpose of the NE steels was to utilize the residuals alloy scrap and it was soon discovered that it was i practical to hold down the 0.20 to 0.40 per cent lir

Postwar Use of NE and High Alloy Steels



Although the National Emergency steels were developed as substitutes when the wartime shortages of alloying elements were most acute, they have encountered an acceptance which is likely to endure in peacetime. On the other hand, a strong comeback is indicated for high alloy steels by these bar graphs

Sulphite-Treated
Alloy and Special Steels

BENEFITS TO USERS

- 25% Greater Machining Speed
- 200% Longer Tool Life
- Fewer Rejections
- More Uniform Physical Properties
- Fewer Operations
- Better Finished Product

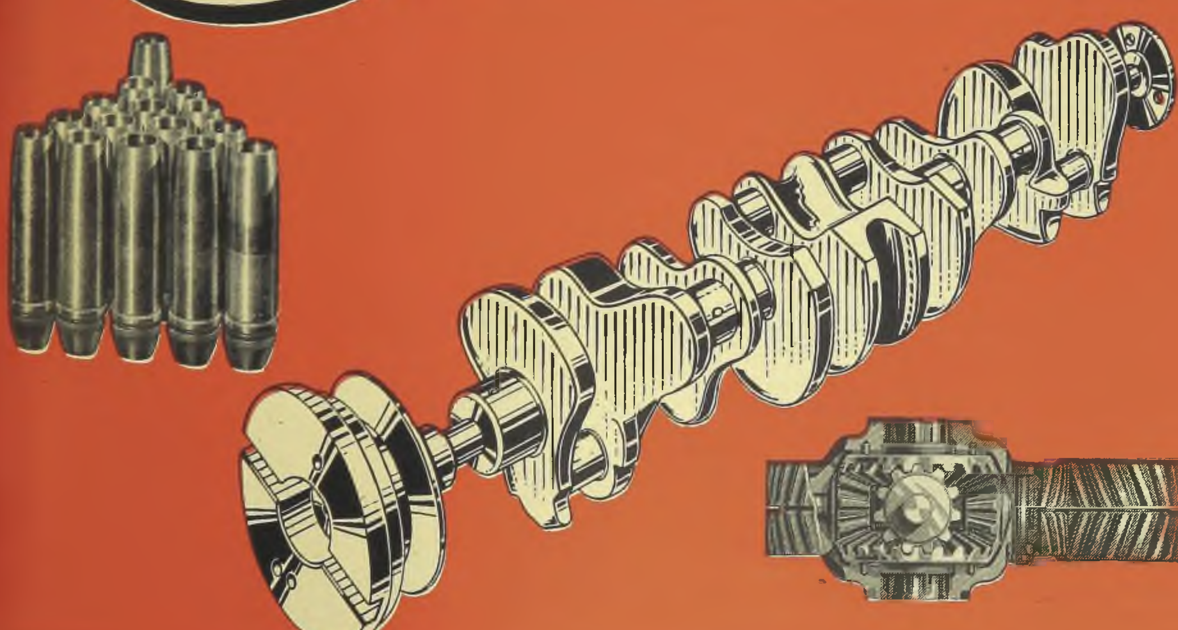
SULPHITE-TREATED alloy and special steels, which we have produced for a number of years, have solved many problems for steel users. They have been most satisfactorily applied where machinability is of first importance.

Sulphite treatment can be applied to most types of steel. It has been used successfully in the production of shells, crankshafts, camshafts, axles, and gears.

If you believe that your company may have an application for sulphite-treated steels, our sales and metallurgical staffs are at your service. We have accomplished satisfactory results for others and are ready to serve you in the same way.

WISCONSIN STEEL COMPANY

Affiliate of International Harvester Company
General Offices: 180 North Michigan Avenue, Chicago 1, Illinois



on nickel in the 9400 series and a further revision was made necessary in December, 1942. In the meantime, other changes included complete elimination of the 8700 series, except 8720, and an extension in the carbon range up to 0.50 per cent in the 8600 group.

In May, 1944, it was decided to make additional revisions to permit greater consumption of nickel-chromium-molybdenum scrap, including some 250,000 tons of turnings monthly which had to be reduced first in blast furnaces prior to conversion into steel. The May changes included restoration of the 8700 series in a wider variety of carbon ranges and the establishment of three new series, designated as 9700, 9800 and 9900. The 9700 series has hardenability characteristics similar to those of the 4000 series. Hardenability of the 9800 series is about half way between that of the 8700 and the 4300 series in the thorough-hardening carbon ranges. The 9900 series, in the low carbon ranges, is designed primarily for carburizing with hardenability slightly in excess of that for the 8700 series.

The NE steels are predicated upon a fact which has been apparent to metallurgists for a long time, that two or more alloying elements are equally effective in strengthening a steel as a larger quantity of one element. However, it also was contended that multiple alloy steels would not respond as well to heat treatment as those primarily employing a single element. Under wartime pressure, it has been found that many of the emergency steels do heat treat well, it being pointed out that maximum hardness is based upon carbon content while depth of hardness is a function of selected alloying elements.

With this background, it is interesting to note the rea tion of the users of steel to the emergency types. Ev dence presented in the chart shows that 49.7 per cent the 1922 plants contacted found the NE steels satisfa tory for wartime products, 45.3 per cent partially ar only 5 per cent found they did not work out well. Th story is considerably different when it comes to peac time products, but sufficiently convincing to make it o vious that the NE steels are definitely here to stay. the plants covered, 28.4 per cent will use these "su stitute" steels after the war, 39.9 per cent will empl them partially and 31.7 per cent will drop them entirel

In the opinion of one outstanding steel industry thority, the percentage figures would tend to indicate th the steel industry may be presented with a postwar d mand for as much as 300,000 to 350,000 tons of steels per month based upon a fairly high level of tivity. In other words, as much as one-third of the al steel produced may fall within the emergency group.

Even though the NE steels have obtained more th a toehold on the steel market, the old standby all will return to high favor with many consumers. A turn to these types will be made by 47.1 per cent of plants, 45.1 per cent will return to them partially, wh only 7.8 per cent of the total, according to this co pilation, will drop them entirely.

Study of the chart showing various employment gro will reveal some variance of opinion which will aff tonnage consumed. The very large plants employing o 1000 men found the NE steels least acceptable for w time use with a percentage of 42 compared with

Use of NE Steels and High Alloy Steels by Consumer Grou

(All figures in percentages)

CLASSIFICATION	NE Steels Satisfactory For Wartime Use			Will Use NE Steels In Peacetime Products			Will Return to For High Alloy Steel	
	Yes	Partially	No	Yes	Partially	No	Yes	Partially
Bar Products—Bolts, Nuts, Rivets, Screw Machine Products	46.4	46.4	7.2	14.5	37.1	48.4	51.7	38.3
Wire Products—Wire Specialties, Cable, Wire Fabric	48.9	42.6	8.5	34.9	39.5	25.6	47.7	43.2
Sheet and Strip Products—Light Gage Tubing, Stampings	56.5	40.1	3.4	33.8	41.4	24.8	40.7	54.9
Plate Fabricators—Including Welded Pipe	62.3	34.8	2.9	46.0	28.6	25.4	36.5	46.2
Structural Fabricators	62.7	35.3	2.0	37.8	40.0	22.2	47.1	44.1
Ornamental and Wrought Iron Fabricators	72.0	28.0	0.0	50.0	37.5	12.5	26.7	46.6
Job Galvanizing, Plating, Heat Treating, Welding	57.1	39.3	3.6	26.9	34.6	38.5	57.9	36.8
Jobbing Machine Shops	50.0	44.8	5.2	24.5	39.7	35.8	45.3	50.9
Dies, Molds for Stamping, Forging and Plastics	45.5	44.2	9.3	27.5	35.0	37.5	52.5	42.5
Building Hardware and Trim—Prefabricated Buildings	52.9	42.6	4.5	33.9	37.3	28.8	44.2	50.0
Heating, Ventilating and Air-Conditioning Equipment	46.6	46.7	6.7	28.2	32.4	39.4	50.8	41.3
Metal Furniture—Cabinets, Kitchen Equipment	56.4	43.6	0.0	30.2	39.6	30.2	55.3	38.3
Containers and Hollow-Ware—Light Pressure Vessels	60.6	37.9	1.5	28.3	40.0	31.7	45.1	47.1
Light Metal Products—Specialties, Light Hardware	57.1	41.4	1.5	32.8	38.7	28.5	49.6	39.4
Plate Products—Boilers, Processing Equipment, Stokers	43.6	51.6	4.8	23.7	44.1	32.2	50.0	46.4
Track Material	50.0	30.0	20.0	20.0	50.0	30.0	50.0	35.0
Locomotives, Cars and Ships	54.8	32.3	12.9	33.3	40.0	26.7	41.3	51.8
Metallurgical and Industrial Furnaces and Kilns	64.0	36.0	0.0	37.5	45.8	16.7	36.9	52.6
Aircraft Accessories and Parts	43.5	53.2	3.3	17.5	38.6	43.9	46.4	41.1
Parts—Auto and Machine	40.8	54 2	5.0	17.2	46.7	36.1	49.1	45.8
Auto-Truck Bodies	66.7	30.8	2.5	31.4	57.1	11.5	44.4	55.6
Small Tools—Cutlery and Flatware	42.7	47.6	9.7	24.0	40.3	35.7	51.4	40.0
Steam Specialties and Valves	38.5	50.8	10.7	23.6	50.9	25.5	47.6	44.3
Agricultural Implements	48.9	46.7	4.4	31.0	47.6	21.4	21.6	67.6
Contractors Equipment	30.6	64.5	4.9	3.8	60.4	35.8	53.4	46.6
Automobiles, Tractors, Trucks, Etc.	20.0	70.0	10.0	25.0	42.9	32.1	40.0	52.0
Electrical Equipment—Industrial, Including Motors	47.3	48.6	4.1	36.1	37.5	26.4	35.9	59.4
Electrical Appliances (Household)	45.2	51.6	3.2	19.4	54.8	25.8	27.6	58.6
Materials Handling Equipment	51.6	46.8	1.6	29.5	42.6	27.9	41.1	51.8
Engines, Water Wheels, Pumps	39.8	52.3	7.9	20.5	44.6	34.9	42.3	56.4
Heavy Machinery	43.8	50.0	6.2	25.0	41.0	34.0	55.5	37.8
Special Machinery	47.7	50.0	2.3	24.7	49.0	26.3	46.6	46.1
Metalworking Machinery	50.0	45.8	4.2	35.0	55.0	10.0	52.4	42.9
Machine Tools	35.7	57.1	7.2	22.4	48.7	28.9	51.9	44.3
Machine Tool Accessories—Tools, Dies, Jigs, Fixtures	30.6	56.9	12.5	16.7	33.3	50.0	61.8	36.8
Instruments—Time and Recording	52.4	42.9	4.7	23.7	45.8	30.5	44.4	51.9
Office Machinery—Typewriters and Calculating Machines	30.8	69.2	0.0	15.4	53.8	30.8	33.8	38.5
Average ALL Plants	49.7	45.3	5.0	28.4	39.9	31.7	47.1	45.1

overall average of 49.7 per cent. The plants employing fewer than 50 men found them most acceptable. These figures make it appear that the prediction as to postwar tonnage may be slightly on the high side.

This is further substantiated by the answers to the question: Will you use NE steels in peacetime products? The very large plants include 21.3 per cent reporting "yes", the smallest figure for any of the seven employment groups. This is partially offset, however, by the 50 per cent figure for "partially."

The same group of large companies is well sold on high alloy steels, as indicated by the fact that only 4.2 per cent will not use them. The balance either will return to them or use them in part. Largest number of plants not planning to return to high alloy steels is in the smaller employment groups.

Study of table on preceding page provides further light on the NE-alloy steel situation. Note, for example that only 20 per cent of the automobile, tractor and truck industry find NE steels satisfactory; only 25 per cent will use them in postwar products and 40 per cent will return to former high alloy steels.

NE steels most likely to continue in volume demand after the war are included in the 8600 and 8700 series since they combine economy with excellent hardenability and physical qualities. The 9400 series is not expected to survive since the alloys are too thin and not properly balanced. Insufficient data have been accumulated on the 9700, 9800 and 9900 series to determine whethe they are likely to continue.

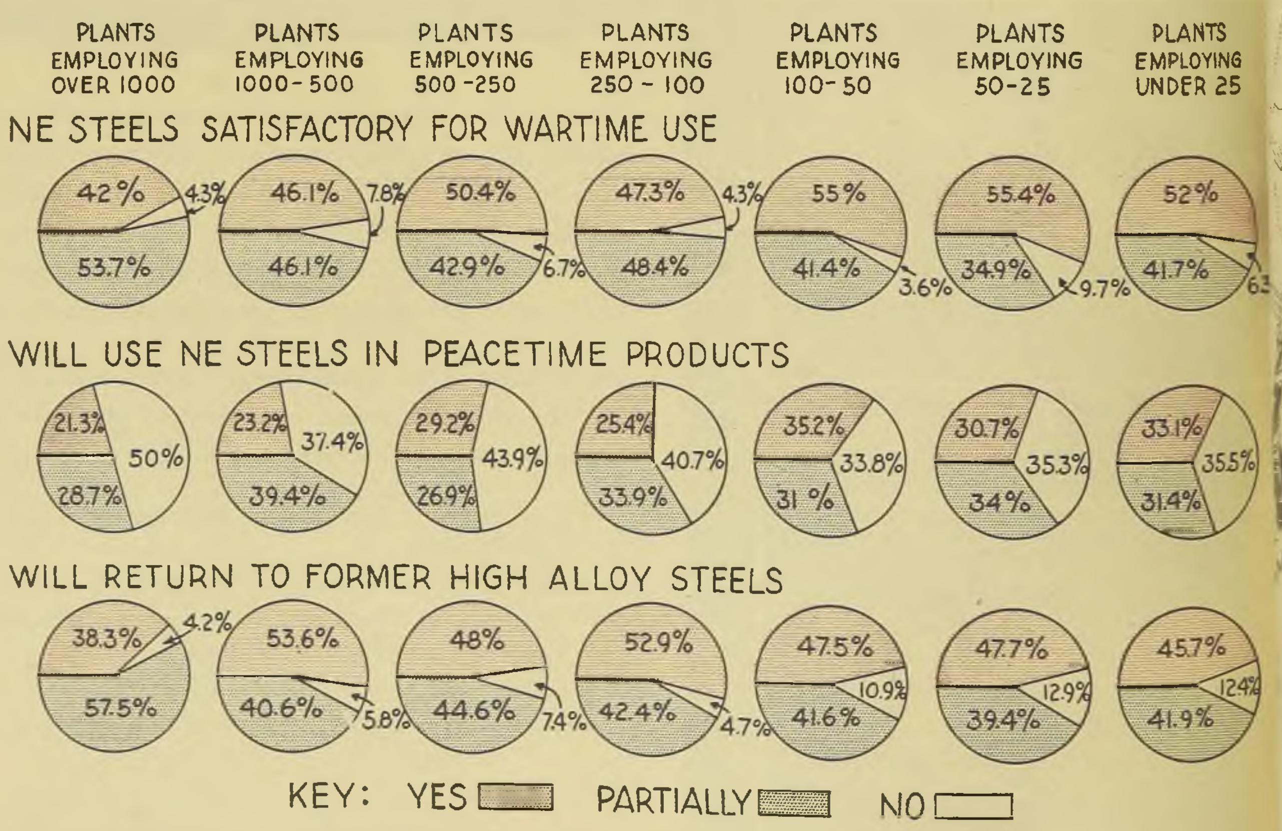
In the auto and machine parts field, 40.8 per cen found the NE steels satisfactory for wartime use. bu only 17.2 per cent will use them in peacetime product and 49.1 per cent will return to high alloy steels. How ever, 46.7 per cent report they will use them partiall after the war, while 45.8 per cent will return in par to alloy steels.

Reports from the machine tool industry are especiall interesting since a number of studies have been mad recently looking toward simplification. All but 7.2 pe cent of the plants found NE steels at least partially su cessful in war applications but 28.9 per cent will not us them in new tools scheduled for marketing later. A but 3.8 per cent will return at least partially to hig alloy steels.

The NE grades were found relatively less acceptable b makers of machine tool accessories than by builders. I fact, only 50 per cent will use NE steels in some for and all but 1.4 per cent plan to return to high alloy

Percentagewise, the emergency steels will encount their broadest use among makers of metalworking m chinery, auto truck bodies and trailers, structural fab cated, structural steel and agricultural implements. Mo opposition appears to be developing among makers of hea ing and ventilating equipment, aircraft parts, dies ar bar products.

Postwar Use of NE and High Alloy Steels by Employment Group



This breakdown by employment groups indicates that the smaller plants found the NE steels more satisfactory in wartime and are more likely to continue their use after the war than the larger ones. Note that very few large plants will not return to high alloy steels, this figure being 4.2 per cent

...their Supply Line starts
Back Here!
★VICTORY, in no small measure, depends on an unbroken supply line of the weapons of war to the various fronts. And that supply line STARTS BACK HERE . . . in the forge plants producing dropped, upset and press-forged parts for planes, tanks, jeeps, guns, trucks and the hundreds of other items embodied in the equipment of modern warfare.
★Helping to keep these forge plants running has been one of our biggest jobs. Thousands of tons of Die Blocks and Hot Work Steels for dies . . . thousands of Piston Rods, Hammer Rams and Sow Blocks for maintenance . . . all carrying the well known Finkl Trade Marks . . . are in the production battle for ultimate Victory!
★These same products and others will be available TO YOU for your peace time production.
A. FINKL & SONS CO.
Chicago
BUY WAR BONDS and STAMPS

Castings, Stampin

Stampings expected to show largest percentage gains in po war product designs although substantial increases also a indicated for other types of fabrications. Castings find mo widespread usage

RECONVERSION of industry to the production of peacetime products poses many problems for industry as well as government. For some industries producing basis materials such as steel, aluminum and copper alloys, the actual physical conversion to peacetime production will be comparatively simple, especially in comparison with others, like the automobile industry, which were virtually uprooted.

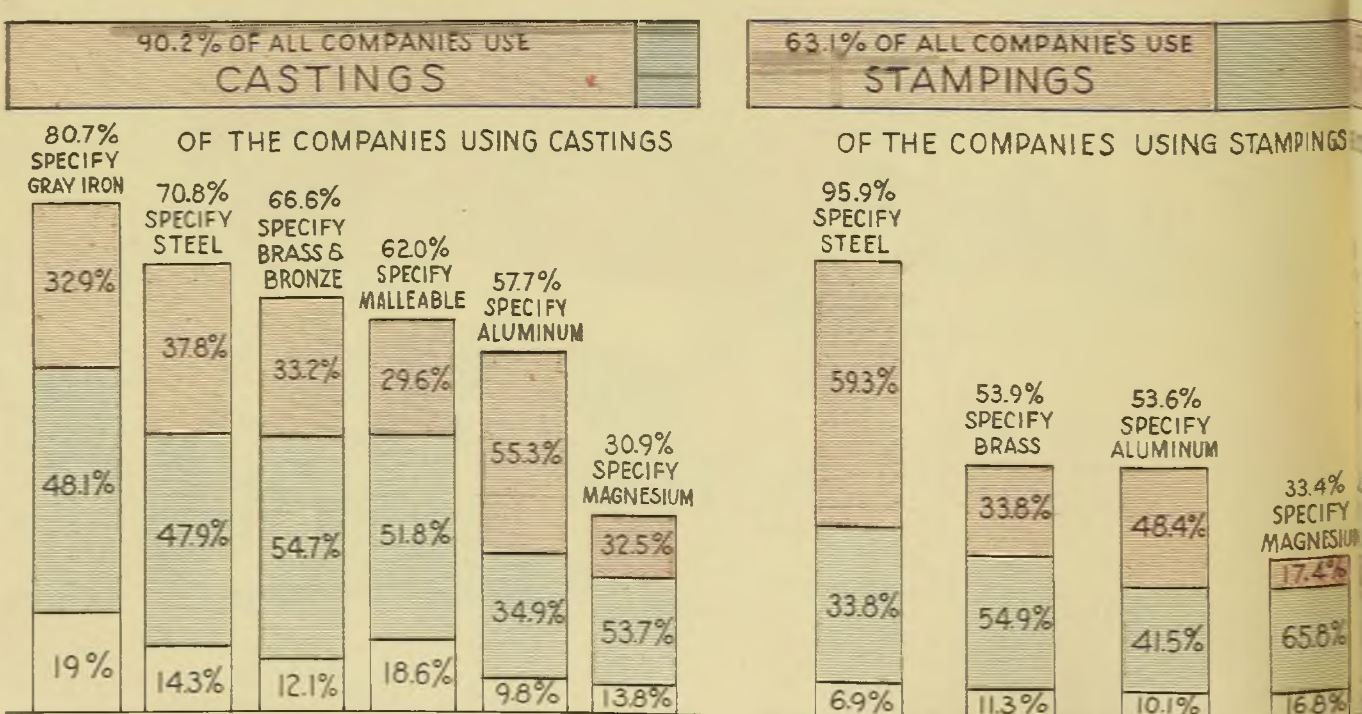
However, for all industries there arises the necessity for gaging markets and the effects of improved production techniques which have come out of the war, many of which are exceedingly significant and will exert a strong influence on postwar product designs. There are a number of processes which have come into recent prominence such as powder metallurgy, investment casting and composite stampings. Further progress also has been made by weldments, involving not only the joining of rolled steel sections but combinations of rolled steel and castings.

For the purposes of this study, STEEL checked the m alworking industry on its preferences for castings, stam ings, forgings and die castings. It is interesting to n that sand castings practically dominate the field from t standpoint of broad usage. Metals in cast form are us by 90.2 per cent of the companies reporting, as agai 63.1 per cent using stampings, 60.7 per cent forgings a 43.1 per cent die castings.

Some types of these semifabrications are expected meet with more favorable reception than others in pea time products, partly as a reflection of experiences gai during the war. Whether these wartime influences w endure, of course, remains to be seen. Some of the velopments reported from industry may provide a clue

In the aircraft industry, centrifugal castings were us to replace forgings for engine cylinder barrels. The rou forged stock for this part weighed 72 compared with pounds for the casting. Machine time was reduced c

Present and Anticipated Use of Castings, Stamp



orgings and Die Castings

derably and the part was shown to be of equal quality. Stampings have been used in the aircraft industry to eplace castings, forgings and multiple part assemblies here the requirement was sufficient to warrant setting p for them. One member of the aircraft industry alone pent $100,000 in engineering studies preparatory to the roduction of rolled sections to replace extrusions which vere in exceedingly short supply at the time. Sections of ropeller blades formerly were forged from seamless tubng, requiring many operations. The industry devised a ethod of taper rolling plate stock which was subsequenty forged into blades. The end result was a more uniorm walled blade produced with a saving of 50 per ent in materials and over 60 per cent in manhours. Die castings have taken the place of sand castings for many parts, with a saving in material and labor.

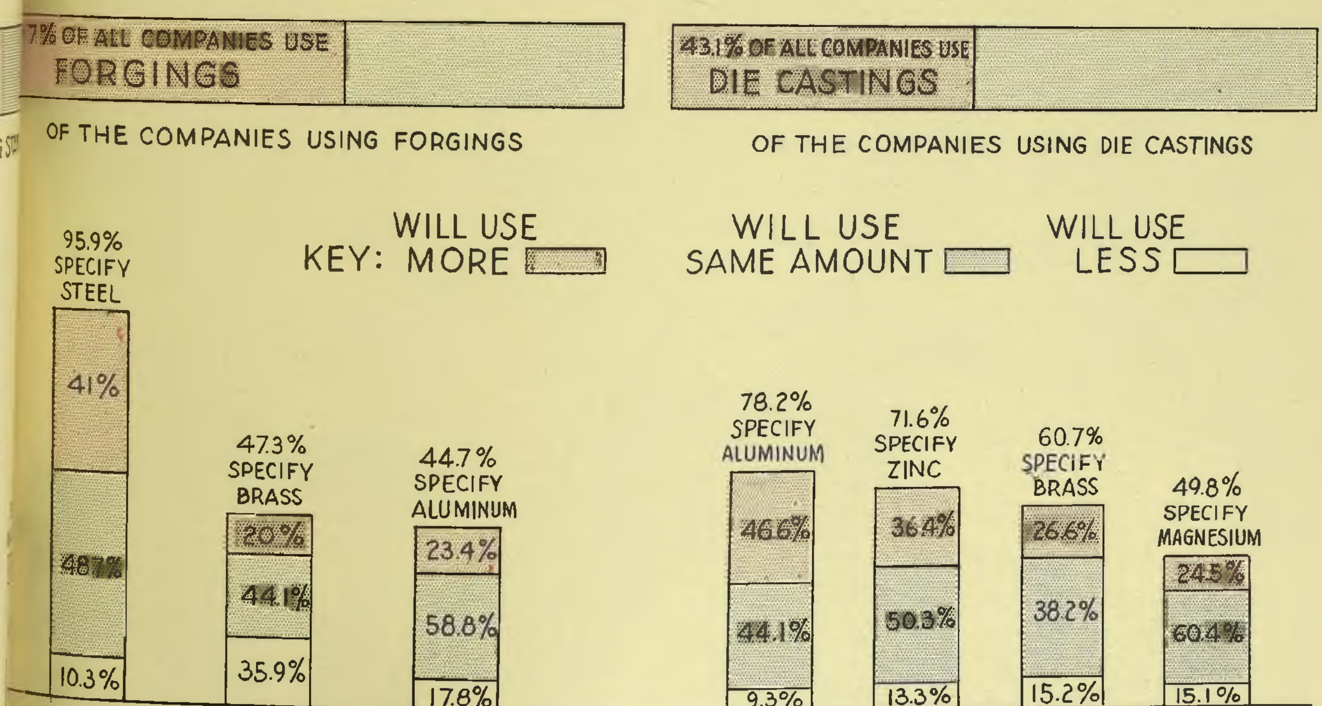
Savings of both materials and manhours are attributed o standardization and simplification of design of radio and adar equipment. For instance, a simplified panel meter contains no jewels, has no moving coil and is enclosed in case stamped out from sheet metal. Die cast connectors eplace those previously machined from steel. Namelates, previously aluminum or brass stampings, now are ormed of plastics.

One of the outstanding developments of the war has een the precision or investment casting process for fabricating parts out of metals that melt at temperatures too high for die casting or which present difficulties in forging, stamping or machining. One of the principal applications has been for turbosupercharger blades cast from an alloy comprising 60 per cent cobalt, 35 per cent chromium and 5 per cent molybdenum. Dimensions may be held within 0.001-inch and parts cast from high strength alloys offer excellent physicals even in small cross sections. It is expected that the process will be extended to ordinary alloy steels.

A new type of cowl ventilator for Maritime Commission ships is stamped out with a special press at a saving of many machine hours and millions of lineal feet of welding. Lighting fixtures on these ships incorporate steel and malleable castings in place of brass and bronze castings and stampings. The United States Coast Guard went so far as to convert buoys from steel to a low pressure plastic laminate. The steel buoy with a cast steel ballast weighed 650 pounds, whereas the plastic buoy with a concrete bal-

These four charts provide a new conception of the market for four important types of fabrications. The horizontal bars indicate the proportion of the metalworking industry using castings, stampings, forgings and die castings. The vertical bars show the breakdown of each by types of materials, as well as anticipated usage in postwar. For instance, among the plants using castings, 80.7 per cent specify gray iron. Of the plants specifying gray iron castings, 32.9 per cent plan to use more, 48.1 per cent will use the same amount and 19 less

gings and Die Castings



METAL JOINING FOR YOU

. . out of wartime's revealing experience with

SIL-FOS and EASY-FLO

On big stuff too, the benefits of SIL-FOS and EASY-FLO speed, reliability and economy are being realized. The example shown, from a marine copper shop, is a 40" expansion joint to which circumferential rings are being brazed with SIL-FOS.

Sil-Fos and Easy-Flo are not war babies. Their remarkable brazing speed, strength and economy were widely capitalized before the war, notably in the refrigeration, electrical, automotive and air conditioning fields.

But war's urgent demands for fast production skyrocketed their use to "believe-it-or-not" proportions. Tons upon tons of Sil-Fos and Easy-Flo have been and are being used on an infinite variety of metal joining jobs in making aircraft, ships, guns, tanks, shells, motor vehicles, electrical equipment and a multitude of other products.

Of "believe-it-or-not" character also are the *results* obtained with these alloys —astonishing production rates—big savings in man-hours—vital conservation of metals—surprisingly low costs. War has taught industry how to get full benefits from Sil-Fos and Easy-Flo brazing. It has brought out the value of preplaced alloys—it has shown that fast heating and handling methods when combined with the low working temperatures and fast action of Sil-Fos and Easy-Flo are the answer to many ferrous, non-ferrous and dissimilar metal joining problems.

START SIL-FOS AND EASY-FLO WORKING ON YOUR NEW PRODUCTION NOW!

Make full use of the lessons of wartime metal joining in your peacetime production. Whatever the nature of your products, if they involve metal joining, find out how Sil-Fos and Easy-Flo can help you make better joints at lower cost.

BULLETIN 12-A gives full details—write for a copy. Also send us your problems—we'll be glad to help you apply modern methods in solving them.

AT THE METAL SHOW
BOOTH No. E-140

—a revealing exhibit of SIL-FOS and EASY-FLO metal joining performance in war and peace

A wide range of large and small SIL-FOS and EASY-FLO war production jobs will be on display, as well as new peacetime parts, showing how many manufacturers are already using the newly developed fast production methods in their manufacture of civilian products. SIL-FOS and EASY-FLO brazing demonstrations will be going on constantly and engineers will be on hand to talk over your brazing problems with you. If you attend the show be sure to visit us at booth E-140.

HANDY & HARMAN

82 FULTON ST., NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada

Agents in Principal Cities

last weighs 300 pounds. A somewhat similar substitution was made by the Navy's Bureau of Yards and Docks when it converted from steel fuel storage tanks to concrete. Navy vessels use pressed steel electrical fittings in place of cast aluminum and welded steel panel boxes for cast aluminum.

Fuze bodies for 40 millimeter shells now are die cast, replacing a part previously machined from aluminum bar stock. Twenty millimeter fuze bodies were converted from brass to die castings. Some types of gun barrels are being rolled on a tube mill, rather than being machined from forgings. Light metal stampings joined at low temperatures with silver brazing alloys without warping or buckling form gun parts and the like as replacements for forgings.

With all of industry's experience with substitute materials and processes, it is interesting to get some glimpse o the future course it expects to take with respect to cas ings, stampings, forgings and die castings.

Further reference to the chart will reveal that 80.7 pe cent of the plants using castings specify gray iron, 70. per cent specify steel, 66.6 per cent brass or bronze, 6 per cent malleable, 57.7 per cent aluminum and 30.9 p cent magnesium.

While aluminum is in fourth place from the standpoi of number of users, it may be expected to show the mo growth in postwar. Of the plants using castings, 55.3 p cent will use more, 34.9 per cent will use the same amou and 9.8 per cent will reduce their requirements.

Steel castings fall in second place with 37.8 per cent the plants using them planning to increase their nee However, the number planning to maintain present u 47.9 per cent, is slightly smaller than for the other fi groups with the sole exception of aluminum. The f that 14.3 per cent will use fewer steel castings indica that the market for steel castings will not expand quite much, relatively speaking, as for brass or bronze, alu num or magnesium but will improve slightly over that gray iron and malleable castings.

Of the plants using brass or bronze castings, 33.2 cent plan to use more, 54.7 per cent will use the sa amount and 12.1 per cent will use less. It will be not that the number indicating "same amount" is the larg for any of the six groups.

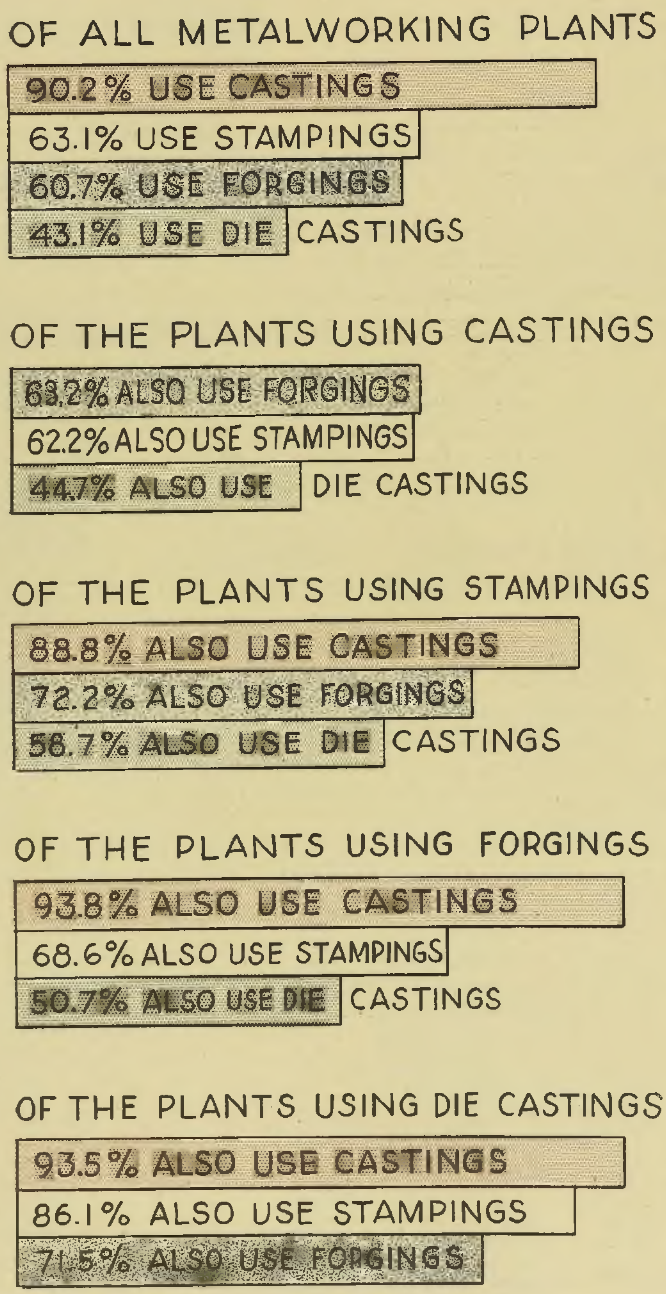
Numerically, gray iron castings top the casting field l anticipated net gains in usage are not quite as large as other types. Of the plants using castings, 32.9 per c will employ more, 48.1 per cent the same amount and per cent less. In the malleable castings group, those w will use less account for 18.6 per cent or about the sa figure as for gray iron. Those using more, however are slightly smaller proportion at 29.6 per cent while the fig for plants using the same amount is higher at 51.8 cent.

Magnesium is not expected to show the same perce age gains in consumption as aluminum, there being a c siderable spread between the 32.5 per cent who will more of the former and the 55.3 per cent who will more of the latter. This disparity, of course, is grea when related to actual numbers of plants. Of the pla using magnesium, 53.7 per cent will use the same amou and 13.8 per cent less.

It has been previously recorded that 95.9 per cent all metalworking plants use steel in one form or anoth It now may be observed from the charts that 95.9 cent of the plants using stampings also specify steel a that of the plants using forgings the same percenta applies.

In the stamping group, the largest net gains are in cated for steel with aluminum in second place, brass th and magnesium fourth. Of the plants using steel stan ings, 59.3 per cent will use more, 33.8 per cent will

Use of Castings, Stampings, Forgings and Die Castings



This chart shows the interrelationship of castings, stampings, forgings and die castings. It will be noted, as an example, that of the plants using castings, 62.2 per cent also use stampings. Plants using stampings employ a considerably larger portion of castings, the percentage being 88.8

the same amount and 6.9 per cent will use less. In the case of aluminum, 48.4 per cent will use more, 41.5 per cent will use the same amount and 10.1 per cent will reduce their requirements. Among the plants using brass stampings, 33.8 per cent will use more but this lower figure is largely offset by the 54.9 per cent which will use the same amount. A decline is indicated by 11.3 per cent.

Magnesium is scheduled for the smallest gains but this is understandable when it is considered that this metal is more readily adapted to casting than press forming and the entire picture very readily could change as more is learned about fabricating it. Some work in this direction is not yet out of the experimental laboratories. Magnesium also is not considered in this study as a forging material but successful methods have been worked out for forming it by this process. Plants now using magnesium stampings indicate that 17.4 per cent of their number will use more, 65.8 per cent the same amount and 16.8 per cent less.

Steel Forgings To Gain

Steel forgings are destined to enjoy a greater increase in business in postwar as compared with aluminum and brass. Of the companies using steel forgings, 41 per cent will use more, 48.7 per cent will use the same amount and 10.3 per cent will use less. Among the aluminum forging users, a considerably smaller proportion or 23.4 per cent will use more, which is partially offset by the 58.8 per cent which will use the same quantity. The balance or 17.8 per cent will use less.

Brass forgings show up rather poorly in third place with 20 per cent of the plants planning to use more, 44.1 per cent the same amount and 35.9 per cent fewer.

Aluminum is revealed to have a slight edge over zinc in the die casting field, 78.2 per cent of those using them specifying the former as compared with 71.6 per cent for the latter. Sixty and seven-tenths per cent of the plants using die castings specify brass and 49.8 per cent magnesium.

In the aluminum group, it will be noted that 46.6 per cent of the plants indicate increased usage of die castings; 44.1 per cent will use the same amount and 9.3 per cent will use less. In the zinc classification, 36.4 per cent of the plants will use more, 50.3 per cent the same amount and 13.3 per cent less.

Although brass is somewhat difficult to die cast, it has surprisingly broad acceptance and further gains appear to be ahead. Of the plants now using brass die castings, 26.6 per cent plan to use more, 58.2 per cent the same amount and 15.2 per cent less. Some expansion also is projected for magnesium, 24.5 per cent of the plants using this type expecting to use more, 60.4 per cent the same amount and 15.1 per cent less.

The interrelationships between the four types of fabrications shown in the chart on page 176 present a most interesting study. For instance, of the plants using castings 62.2 per cent also employ stampings, but of the plants using stampings a larger proportion or 88.8 per cent also use castings.

Over 93 per cent of the plants using forgings make some use of castings, while the percentages for stampings and die castings are measurably lower at 68.6 and 50.7 per cent. Die castings find their largest market among users of sand castings, with plants using stampings and forgin next in line.

A study of the potential postwar markets for castin and other types of parts among plants of various sizes r veals a somewhat different picture than the overall figur For instance, a large proportion of the plants which w use fewer gray iron castings are in the employment grou with 250 workers and more.

The future for malleable castings may be regard slightly more optimistically since the plants expecting use fewer are fairly well distributed among the seven e ployment groups, the under-25 classification being the ception with an indication of less than half the avera loss.

The largest percentage gains in steel castings appea be among plants employing fewer than 250 men but outlook also is a shade better in the larger employm groups than for gray iron or malleable castings.

The prospects for aluminum castings by no means p allel those for the five other types. The largest net g will take place in the 1000-500 employment group w 63.8 per cent of the plants indicating increased use, per cent the same amount and 4.3 per cent less. For over1000 group, the respective percentages are 54.3, and 13.1. Substantial increases, of course, are also i cated in the other groups. The net increases in b or bronze castings are principally in the smaller emp ment classifications.

Prospects for Stampings Excellent

Principal cutbacks in magnesium castings will take p in the two top employment groups although somev similar recessions are scheduled for those with 250 and 50-25 workers.

Among the large plants with over 1000 workers, stampings probably will enjoy somewhat larger gains those of other materials. Only 6 per cent will use fe as compared with 15.7 per cent for aluminum, 16. cent for brass and 19.1 per cent for magnesium.

Steel also appears to be slated for slightly greater gains in the over-1000 employment group than alumi or brass in the forging field. Plants using steel forg report 33.6 per cent of their number will use more, per cent the same amount and 14.3 per cent less. those using aluminum forgings, 27.1 per cent will more, 51.8 per cent the same amount and 21.1 per less. For brass, the relative figures are 18.5, 58.7 22.8 per cent. Largest percentage increases for all t types of forgings will occur among plants employing fe than 250.

Aluminum and zinc are almost in identically the s position among plants with over 1000 workers. Of t using aluminum die castings, 46.3 per cent plan to more, 42.7 per cent the same amount and 11 per fewer. For zinc, the respective figures are 47, 42 an per cent. In the 1000-500 classification, aluminum h slight edge with 41.5 per cent planning to use more, per cent the same amount and 13.9 per cent fewer. figures for zinc are 33.3, 47.6 and 19.1. In the 500- group, the two metals are closely parallel but some ance is noted among smaller plants. Both brass and m nesium show smallest projected net gains among the la plants included in this list.

Specification c

Overwhelming majority of plants favor purchase of materi on basis of physical characteristics rather than chemical alysis. Hardenability band data already available for mc national emergency and alloy steels

A MOVEMENT now is well underway which may eventually lead to a veritable revolution in steel purchasing methods and which may also be extended to other materials. An overwhelming majority of steel users now express a willingness to buy steel on the basis of how it may be expected to perform in service rather than making their selections primarily on chemical analysis.

Over the years, it has been the practice among both the individual steel producers and their customers to designate steels in terms of SAE numbers, or in other words, in terms of their chemical compositions limits and ranges. This practice has been especially pronounced in the purchase of alloy steels since the varying amounts of alloying elements exert a profound effect on their usefulness, while this is not true to the same extent in the carbon steel ranges.

Back of the practice to specify steel by number has been the desire on the part of consumers to purchase a steel for a given application which will provide uniform results. Some time back, it was the general impression that several heats of steel of identical analysis would, by the same token, perform in identically the same manner. Metallurgists in recent years have learned considerably more about the likely reactions of steel. While the chemical constituents of steel are of utmost importance, it now is common knowledge that other factors also must be reckoned with, such as deoxidation practice and grain size.

More recently, a great deal of emphasis has been placed upon hardenability as a means of evaluating a steel, as an outgrowth of the development of the speedy Jominy end-quench test. This test is based upon the principle that hardening of steel by quenching is a function of heat extraction, with a high rate of extraction resulting in high hardness and a slow rate in low hardness values. As a general rule, each rate of cooling has a corresponding hardness. The cooling rate, of course, diminishes from the surface to the center of a steel section and hardness is reduced in relation to carbon content. Higher hardness in the lower cooling rate brackets may be obtained through the addition of alloying elements, such as nickel, chromium, vanadium and molybdenum. It therefore will be seen that the effect of the lower cooling rate at the center of a steel section may be offset to some extent by the use of alloying elements.

Briefly, the end-quench test involves water quenching a normalized or annealed test bar 1 inch in diameter 3⅞ inches long after it has been brought up to pr temperature. Only the end of the specimen is quenc and it therefore becomes obvious that the rate of coo up from the quenched end tapers off along with the gree of hardness. Somewhere along the length of specimen are points that represent practically ev quenching condition. Hardnesses, for instance, ¾, 1 1/16 and 1½ inches from the quenched end is equ lent to that at the center of 1, 2, 3 and 4-inch round quenched in still oil.

The familiar hardenability curves are obtained by ting hardness values against the distance from the wa cooled end. By correlating these results with hard tests made on various size parts, a close prediction be made of the hardness possible in a desired sect Hardenability bands are simply the area between two quench curves representing the high and the low h ness values which might be obtained from a numbe heats representative of normal steelmaking practice in ducing alloy steels.

The consumer of steel naturally is interested in the rowest possible spread between the minimum and ma mum hardness values since it is an indication of c control over steelmaking practice, as well as providin promise that the steel will respond in a uniform fash to heat treatment. It has been the practice in the past keep a close watch over chemical analysis as a means assuring uniformity. The opinion now is growing t control over hardenability as a supplement to chemi composition will allow the steelmaker more latitude the quantity of each alloy addition and consequently w permit adjustments at time of melting. In this way, consumer is likely to obtain a steel which will be mo uniform from heat to heat.

The use of hardenability as the basis for specifying not entirely new although the movement actually did get under way until mid-1943. At least one machine t company wrote its original specification requiring hard ability tests as early as 1936. This company frequen has accepted steel slightly off-analysis when the init hardness, hardenability, and structure conform with spe fications. In no instance has this company experienc failure or difficulty in accepting such items. Of cour the hardenability test used was somewhat different fr the Jominy test, but it served the purpose very well a

erformance

ie sample was much more readily obtained. However, is test could not be used as well for comparative purposes.

Considerable publicity has been given hardenability ands through the editorial and advertising pages of STEEL id other technical journals in recent months since this ethod of specifying now is an actuality. As the result work by joint committees of the American Iron and teel Institute and the Society of Automotive Engineers, ardenability bands have been set up for a number of onstructional alloy steels and although termed "tentative" re considered satisfactory for use. Any changes deemed ecessary will be made after a 6-month trial period.

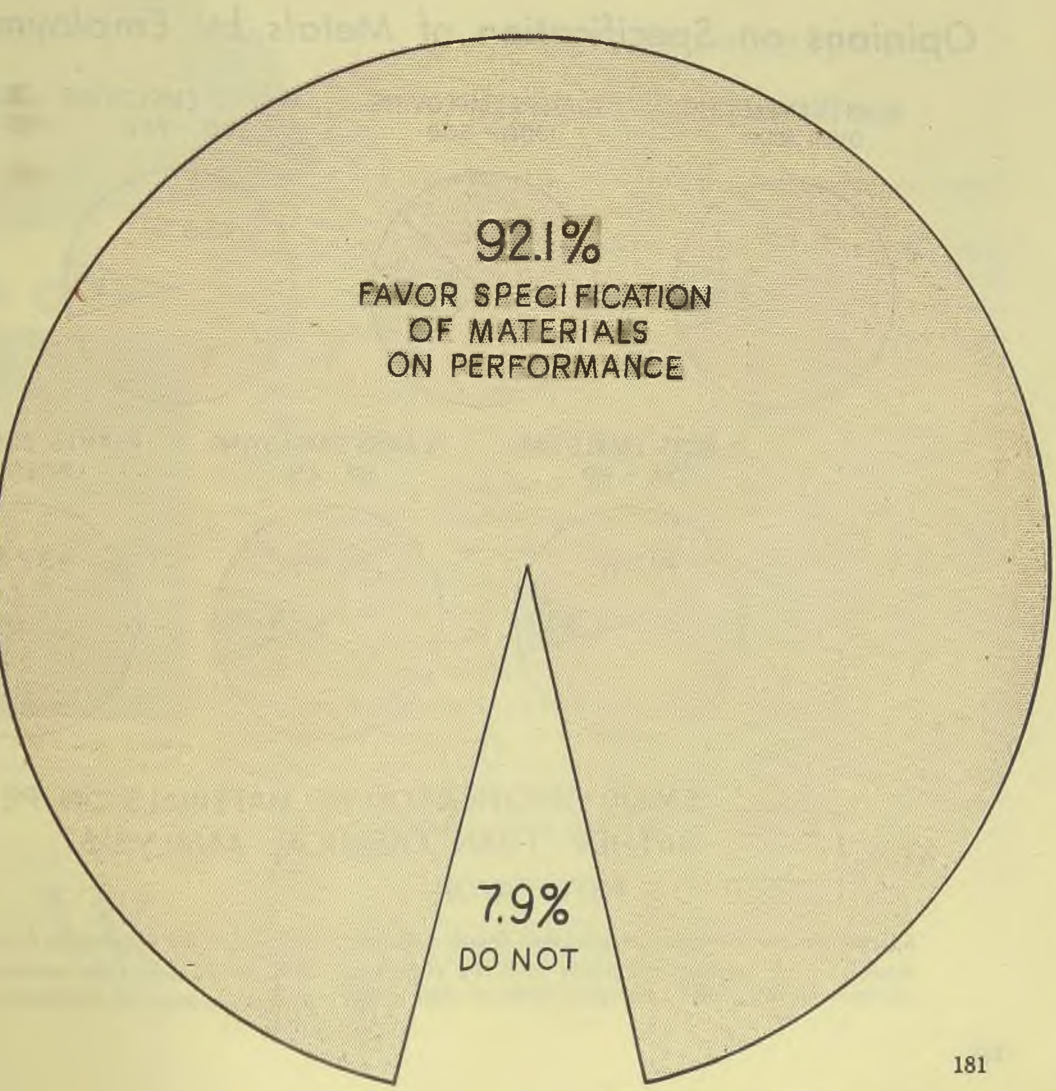
The steels covered are specifically the chromium-molyb-lenum SAE-4100 series in carbon ranges from 0.28 to 0.54 per cent; the chromium-nickel-molybdenum NE-8600 and 700 series in carbon ranging from 0.17 to 0.54 per cent, AE-4340 chromium-nickel-molybdenum steel and SAE-4620 nickel-molybdenum steel. Chemical compositions of these steels have been modified somewhat to provide steel producers with more latitude in steelmaking practice and thus permit individual plants to make necessary adjustment so that hardenability limits may be met. These modifications are not great enough to influence the general characteristics of the several steels.

As a means of properly identifying steels specified to hardenability band limits the suffix letter H has been added to the conventional series number, as will be noted by reference to Table I. When steel is specified with the letter H, all conditions pertaining to chemical composition limits, testing technique and the like apply. All of the steels are made to fine grain steel practice.

The tentative hardenability bands set up for each of the H steels indicate hardness values desired at any particular distance, in sixteenths of an inch. Steel users are being advised not to specify the entire length of the curve but hardness values at only two specific points.

While there has been fairly general agreement that specification on the basis of hardenability bands constitutes a forthright movement, there has been no information available up to this time as to the extent of its acceptability among users of ma'erials. The reports of nearly 2000 metalworking plants to STEEL as depicted in the large pie-chart should leave no doubt as to its acceptance,

eports from metalworking plants to STEEL indicate that the trend toward specification of materials on the basis of performance rather than chemical analysis has blossomed out into a full-fledged and overwhelming movement



inasmuch as 92.1 per cent favor specifying on performance, while only 7.9 per cent are opposed.

The same opinions carry down through the various employment groups with one notable exception. Plants with 1000 to 500 employes report that 22.2 per cent of their number are opposed to specification of steel and other materials on physical characteristics rather than chemical analysis, while 77.8 per cent are in favor of the movement. For all other plant groups, the figures are close to the general averages.

Of the plants employing over 1000, the percentages are 91.1 per cent in favor and 8.9 per cent opposed; for the 500-250 group 92.5 per cent in favor and 7.5 per cent opposed; for 250-100, 93.1 and 6.9; for 100-50, 91.7 and 8.3; for 50-25, 90.4 and 9.6, and for under 25 employes, 92.2 and 7.8.

Just how some of the leading consuming industries feel about the matter is set forth in detail in the table on page 188. Only the electrical appliance industry goes all-out with a 100 per cent vote in favor of the movement but the opinions are close to being unanimous in several others. These include plate fabricators, makers of air conditioning, ventilating and air conditioning equipment, plants producing metal furniture, cabinets and kitchen equipment, manufacturers of industrial electrical equipment including motors and heavy machinery builders. Many other consumer groups are in the high nineties.

The greatest opposition to the movement is expressed by makers of office machinery such as calculators and typ writers. In this group 23 per cent are opposed and per cent in favor. Much has been rumored about t uses the automobile industry will and will not make of N and carbon steels. As for specification on performan this industry includes one of the largest opposition grou with 18.5 per cent opposed and 81.5 per cent in fav Some opposition also is noted among producers of scr machine products, ornamental and wrought iron fabricat and contract machine shops.

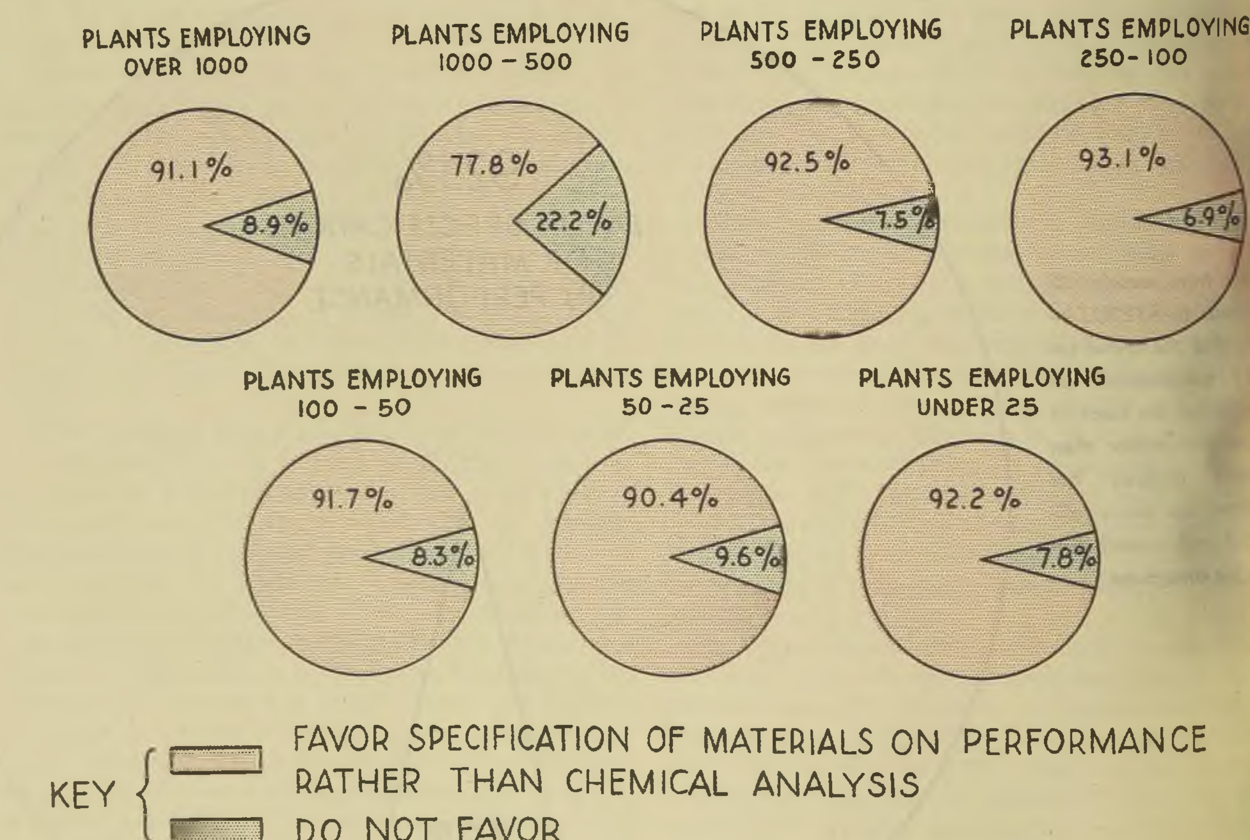
As for machine tool builders, 92.5 per cent favor p chase of materials on the basis of physical characterist while only 7.5 per cent are opposed. However, a spok man for this industry offers these qualifications: "Mach tool builders will continue to specify steel by chem analysis, that is, by SAE number, but probably will more critical of its meeting physical characteristics ability to perform before they start to machine it."

The metallurgist for one of the large corporations su marizes the situation in this way:

"Insofar as most of the engineering steels are concern we believe that the trend will be toward specifying the basis of ability to perform rather than on chem analysis, although it is quite likely that both chem analysis and physical properties will be specified for sc time to come.

"When it comes to specifying steels and irons for spe purposes, such as for heat and corrosion resistance,

Opinions on Specification of Metals by Employment Groups



Specification on performance gets the almost complete support of all employment groups with the exception of medium-size plants employing 1000 to 500. This deviation is not believed to be great enough to interfere with continuance of the movement, being a reflection in some cases more of indifference than active opposition

SIMPLIFY QUALITY CONTROL

with

easy-to-analyze x-ray inspection

Quality control of castings and weldments is easy, fast and absolute with x-ray inspection.

For example, suppose you have a casting that must be perfected before large scale pourings are practical. All you have to do to perfect quality is make small test casts—x-ray them—and you have an easy-to-analyze picture that shows up such variables as temperature of pour, location of gates and risers, ramming and shrinking.

Once perfected, an occasional x-ray is all that is necessary to maintain quality control—for there is no need for routine examination of every piece. Workmen learn quickly and pictorially the advantages and disadvantages of each modification in metal working procedures. And you make each test of quality absolutely —nondestructively.

Above all, you have pictorial proof for your customers that your products meet their established standards. No arguments—no renegotiations—no excuses.

X-ray is at work on hundreds of war jobs—saving machine and man-hours, conserving critical materials, speeding production, controlling quality and helping train workers. For more information, write for B-3159. It's a simplified booklet that shows you how and where x-ray can be used in industry.

J-02024

LOOK INSIDE WITH X-RAY

This radiograph shows a blowhole in an aircraft casting . . . a typical example of how x-ray reveals subsurface defects.

Westinghouse INDUSTRIAL X-RAY

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

THE SW ISC ELECTRONIC *Flame Cutter*

belongs in every plant where quantities of steel plate are flame cut.

Informative Bulletin Available

Write Struthers Wells for Bulletin No. 54-T today. It contains complete operational and factual data on this newest industrial application of Electronics

Here is an amazing Electronic development that provides fabricating plants, steel mills, shipyards, etc. with faster, more accurate flame cutting, with resulting lower costs. It eliminates all need for templates, layouts, etc., in large, production flame cutting.

Light plastic records control all cutting along any desired contour in a horizontal plane. Cutting may be reproduced from the original records either successively, intermittently or in widely separated locations and re-used an unlimited number of times.

STRUTHERS WELLS CORPORATION
SPECIAL EQUIPMENT DIVISION
TITUSVILLE, PENNA.
PLANTS AT TITUSVILLE, PA. WARREN, PA. · OFFICES FROM COAST TO COAST

hink it essential that the chemical specification be spe-ified. For example, a cast iron for heat resistance should e specified on the basis of its chemical composition sim-ly because as far as we know there is no short method f testing this to see whether it would meet service re-uirements.

"The same is true as regards the stainless steels, espe-ially the stabilized ones. The knowledge accumulated uring the last 20 years or so on the use of the stainless eels is based more on chemical composition of these eels than on any short time tests that could be made on e steel prior to shipment. If the conditions under which tainless steel is to be used could be precisely described, e steel companies might be willing to furnish the steel n the basis of ability to perform. However, we doubt ether many steel companies would be prepared to do at the present time.

"Where only mechanical properties are specified, the ical composition of the steel to be furnished will in probably be left to the discretion of the steelmaker. ever, in those cases where some special type of serv-is required, such as resistance to oxidation or resist-to certain chemicals, it will probably be best for time for the user to rely on compositions that are to be good rather than to attempt to purchase on sis of performance."

nother well known metallurgist has this to say: "I not imagine any intelligent user of alloy steel favor-the present movement toward the specification of on the basis of physical characteristics without any ence to chemical analysis. This is obviously due to that each different chemical analysis range means nt forging temperatures and heat treating cycles for hardening and annealing."

engineer associated with a large research organ-says: "In our contacts with industry, we see a tendency to select materials on the basis of per-rather than analysis. This seems to be a healthy nd. It is important, however, to make sure that test methods are available to truly evaluate performance fac-rs and that the results of tests are properly inter-reted. The work of the aircraft manufacturers on the ght alloys illustrates this, as in connection with form-g problems the appraisal of different materials with re-ard to ductility at zero gage length gives not only a ifferent rating to different materials but evidently one at is more closely related to performance in forming perations than a rating determined by ductility as de-rmined on the usual test bar over the conventional gage ngth."

Comments on materials and specifications by the vice resident of one of the leading machine tool builders may e taken as typical for all industry:

"No one really knows what the future holds in store for etals and new uses. There have been so many new ings developed during the last 2 or 3 years which pri-te industry has not had an opportunity to try, that it ds me to believe there will be quite some radical nges in manufacturing procedure; but it is too early predict with any reasonable certainty in which direc-n the trend may be.

"From our own point of view we visualize a more ex-nsive use of die castings, probably aluminum and zinc,

TABLE I
H STEEL SERIES

These steels, available in electric furnace or open hearth grades in blooms, billets and bars, may be specified on the basis of hardenability bands. Ranges and limits which follow apply only to material not exceeding 100 sq. in. in cross-sectional area, or 18 in. in width, or 7000 lb. in weight, per piece as the total product of the ingot, and excludes all plates, shapes, sheet, strip and slabs.

Steel Designation	Chemical Composition, per cent					
	C	Mn	Si	Ni	Cr	Mo
SAE or						
AISI 4130H	0.27/0.34	0.35/0.65	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4132H	0.30/0.37	0.35/0.65	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4135H	0.32/0.39	0.60/0.95	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4137H	0.35/0.43	0.60/0.95	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4140H	0.37/0.45	0.70/1.05	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4142H	0.40/0.48	0.70/1.05	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4145H	0.42/0.50	0.70/1.05	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4147H	0.44/0.52	0.70/1.05	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4150H	0.46/0.54	0.70/1.05	0.20/0.35	—	0.80/1.15	0.15/0.25
AISI 4340H	0.37/0.45	0.60/0.95	0.20 0.35	1.50/2.00	0.65/0.95	0.20 0.30
AISI 4620H	0.17/0.24	0.40/0.70	0.20 0.35	1.50/2.00	—	0.20/0.30
NE 8620H	0.17/0.24	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.15/0.25
NE 8622H	0.20/0.27	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.15/0.25
NE 8625H	0.22/0.29	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.15/0.25
NE 8627H	0.25/0.32	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.15/0.25
NE 8630H	0.27/0.34	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.15/0.25
NE 8632H	0.30/0.37	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.15 0.25
NE 8635H	0.32/0.39	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.15 0.25
NE 8637H	0.35/0.43	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.15 0.25
NE 8640H	0.37/0.45	0.70/1.05	0.20/0.35	0.35/0.75	0.25/0.65	0.15 0.25
NE 8642H	0.40/0.48	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.15 0.25
NE 8645H	0.42/0.50	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.15/0.25
NE 8647H	0.44/0.52	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.15 0.25
NE 8650H	0.46/0.54	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.15 0.25
NE 8720H	0.17/0.24	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8722H	0.20/0.27	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.20 0.30
NE 8725H	0.22/0.29	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.20 0.30
NE 8727H	0.25/0.32	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8730H	0.27/0.34	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.20 0.30
NE 8732H	0.30/0.37	0.60/0.95	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8735H	0.32/0.39	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8737H	0.35/0.43	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8740H	0.37/0.45	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8742H	0.40/0.48	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8745H	0.42/0.50	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8747H	0.44/0.52	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30
NE 8750H	0.46/0.54	0.70/1.05	0.20/0.35	0.35/0.75	0.35/0.65	0.20/0.30

NOTE 1 — Phosphorus and sulphur on open hearth steel to be 0.040 per cent Mx. each
Phosphorus and sulphur on electric furnace steel to be 0.025 per cent Mx. each

NOTE 2 — Small quantities of certain elements may be found in alloy steel which are not specified or required. These elements are to be considered as incidental and acceptable to the following maximum amounts: Copper 0.35 per cent; Nickel 0.25 per cent; Chromium, 0.20 per cent; Molybdenum, 0.06 per cent.

NOTE 3 — The chemical ranges and limits shown in Table I are subject to the standard permissible variations for check analysis shown in Table II.

NOTE 4 — NE denotes National Emergency Standard Steel.

TABLE II
STANDARD PERMISSIBLE VARIATIONS FROM SPECIFIED CHEMICAL RANGES AND LIMITS APPLICABLE TO H STEELS

Element	Limit or maximum of Specified Range	Standard Variation Over or under the Limits Set
	(Per Cent)	
Carbon	All Ranges	0.01
Manganese	To 0.90 incl.	0.03
	Over 0.90 to 2.00 incl.	0.04
Phosphorous		0.005
Sulphur	To 0.060	0.005
	Over 0.060 not subject to check	
Silicon	To 0.35 incl.	0.02
	Over 0.35 to 2.20 incl.	0.05
Copper	To 0.50	0.02
	Over 0.50 to 1.00 incl.	0.05
Nickel	To 1.00 incl.	0.03
	Over 1.00 to 2.00 incl.	0.05
	Over 2.00 to 5.25 incl.	0.07
Chromium	To 0.90 incl.	0.03
	Over 0.90 to 2.10 incl.	0.05
	Over 2.10 to 3.99 incl.	0.10
Molybdenum	To 0.20 incl.	0.01
	Over 0.20 to 0.40 incl.	0.02
	Over 0.40 to 0.60 incl.	0.03
	Over 0.60 to 1.00 incl.	0.05
Tungsten	To 1.00 incl.	0.05
	Over 1.00 to 4.00 incl.	0.10
Vanadium	To 0.50	0.03


RX GAS
DX GAS
CHAR-MO GAS
CG GAS
NX GAS
CO
N_2
H_2O
H_2
CO
We're Ready to Discuss the Major Developments in Heating and Heat Treating at
BOOTH B-608
Upper Exhibit Hall
NATIONAL METAL CONGRESS
October 16th - 20th

as being desirable both from appearance and in effecting economy of manufacture. Likewise, powdered metal will be used in a variety of ways. We foresee a much greater usage of some of the lighter materials like aluminum and magnesium, particularly for such parts on a machine as are removable, for instance, the universal head on a tool and cutter grinder.

"Plastics will appear in the design of our machines of the future; and there is no question but what we will do more with stampings as we foresee a strong competitive market and the need to reduce costs. We have already found it very much to our advantage to change the material specifications on a number of our smaller parts from cast iron to fabricated steel.

"We visualize a series of developments in steels and other materials which will make them tougher and lighter —a trend already evident, of course, in the aircraft industry. This will mean that machine tool manufacturers will have to keep pace with developments in the materials field—and how will this be done? First, by designing more rugged machines and better cutting tools. This latter will mean inserted tooth carbide milling cutters and other innovations. Manufacturers should, if they are alert, give more thought to the proper grinding of their to both as to finish and cutting angles.

"Relatively, grinding will play a more important part the fabrication of small pieces. For instance, there be the need for greater accuracies and higher finishes parts going into engines and moving parts all the from refrigerator pumps to large aircraft motors. Gri ing and lapping will be the medium for holding these pa to the required tolerances and finishes which will be r in terms of micro-inches.

"Lastly, from field observation, my comments might summarized in the statement that postwar manufact will be highly competitive. Restrictions have already b placed on labor—that is, wages. Therefore, for one to compete with another and obtain an advantage, it be necessary to turn to materials and methods. We ture to predict that in the future there will be more tensive use of forgings, stampings, die castings powdered metal, and substitution with relatively lig but stronger materials. The steel suppliers should re nize these needs of the manufacturer by supplying m metal shapes and sizes in an effort to assist in the re tion of overall manufacturing costs."

OPINIONS ON SPECIFICATION OF METALS BY VARIOUS CONSUMER GROUPS

CLASSIFICATION	Specification of Metals On Performance Rather Than Chemical Analysis (Per cent) Favor	Do Not Favor
Bar Products—Bolts, Nuts, Rivets Screw Machine Products	86.1	13.9
Wire Products—Wire Specialties, Cable, Wire Fabric	95.9	4.1
Sheet and Strip Products—Light Gage Tubing, Stampings	91.1	8.9
Plate Fabricators—Including Welded Pipe	97.3	2.7
Structural Fabricators	90.9	9.1
Ornamental and Wrought Iron Fabricators	87.0	13.0
Job Galvanizing, Plating, Heat Treating and Welding	85.2	14.8
Contract Machine Shops	88.1	11.9
Dies and Molds—for Stamping, Forging and Plastics	92.9	7.1
Building Hardware and trim—Prefabricated Buildings	96.0	4.0
Heating, Ventilating and Air-Conditioning Equipment	97.5	2.5
Metal Furniture—Cabinets, Kitchen Equipment	97.1	2.9
Containers and Hollow-Ware—Light Pressure Vessels	89.3	10.7
Light Metal Products—Specialties, Light Hardware	91.4	8.6
Plate Products—Boilers, Processing Equipment, Stokers	94.1	5.9
Track Material	90.0	10.0
Ships, Cars, Locomotives	96.8	3.2
Metallurgical and Industrial Furnaces and Kilns	80.9	19.1
Airplane Accessories and Parts	95.2	4.8
Parts—Auto and Machine	90.9	9.1
Truck Bodies, Trailers	95.1	4.9
Small Tools—Cutlery and Flatware	85.9	14.1
Plumbers' Supplies—Steam Specialties, Valves	95.5	4.5
Agricultural Implements	92.0	8.0
Contractors' Equipment	88.5	11.5
Automobile, Trucks, Tractors, Airplanes	81.5	18.5
Electrical Equipment—Industrial, including Motors	97.2	2.8
Electrical Appliances and Assemblies	100.0	0
Materials Handling Equipment	93.8	6.2
Engines, Pumps, Compressors and Hydraulic Equipment	91.7	8.3
Heavy Machinery	97.9	2.1
Special Machinery	93.9	6.1
Metalworking Machinery	95.6	4.4
Machine Tools	92.5	7.5
Machine Tool Accessories—Tools, Dies, Jigs, Fixtures	91.2	8.8
Instruments—Time and Recording	95.6	4.4
Office Machinery—Typewriters and Calculating Machines	77.0	23.0
Average all Plants	92.1	7.9

As one authority says, a be word than "specification" for w meets the design engineer's pr lem would be "selection", fo would imply picking somet adequate from a number of al nates, whereas "specification" come to imply identity, and to clude all possibly useful mate save the one that previously c into use, possibly on the basi good selection at that time fro number of earlier materials but sibly by chance. Selection by gineering judgment based on data, and without regard for tra tion, is the way to find alterna

One can easily sum up principles of the selection, t ing and specification of engineer metals—good selection, good t ing and good specifications.

From the data now availal it would appear that specificat on performance cannot be ad ted as the sole criterion in sel ing steel and the nonferrous met But there can be little doubt its importance as an aid in sel ing materials, supplementary chemical analysis. In the st field, for example, there are m tonnage applications where sel tion on performance would be in order, such as high temp ature steels, certain stainless ste some carburizing steels, steels nonstressed applications and some parts of small cross section

Special Metal Shapes

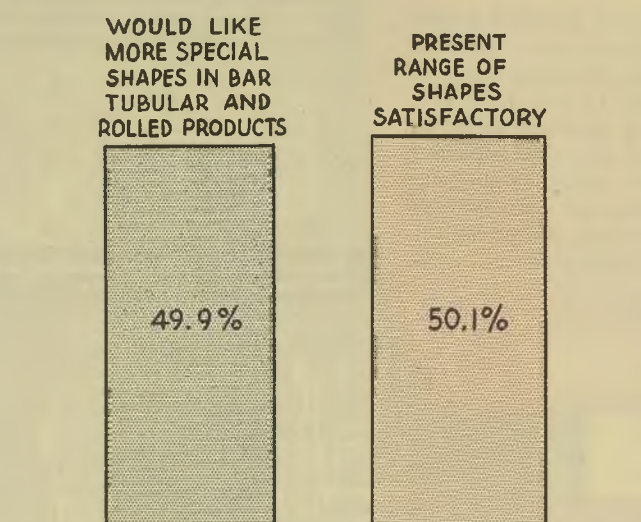
Nearly half of all plants exhibit preference for special rolled and drawn sections to facilitate fabrication by welding and other means. Wartime simplification program also may carry over into peacetime

FUTURE of special metal shapes after the war may be decided as much by developments of the past few years as by traditional considerations of economy, simplicity of application, appearance and availability of materials possessing desired characteristics.

Whether variety of nonstandard shapes in structural and constructional steels and aluminum alloys increases as a corollary of the really great improvement in production welding, or decreases in line with a trend toward standardization of end products and simplification of engineering materials fostered during the war, time alone will tell.

STEEL's survey of 1922 plants discloses an almost equal division of opinion among those who feel the need for more special shapes and sizes to facilitate fabrication of their products in postwar and those who are satisfied with the somewhat more simplified range set up under war regulations. Actual figures are 49.9 per cent in favo an increase; 50.1 per cent opposed. Of the 37 indu groups canvassed, responses of about one-third are supreme interest because they constitute the largest ma in terms of tonnage. Majority of those favoring the crease use welding extensively, a fact which undoubt weighs high in their decision.

Views on Special Shapes



A standoff is shown between those wishing more special shapes to facilitate fabrication of their products in postwar and those feeling that the present, somewhat more simplified range set up under wartime regulations is satisfactory. Perhaps two parallel trends are indicated

Gains have been made in adapting standard sh converted by fabricators to specialized uses in mach tool bases, diesel engine beds, and frames and even p of the driving mechanisms of much heavy machinery, which credit must be given the pressbrake, flamecut and welding. Progress made with shapes specially signed to lighten weight and reduce cost of construc bridges and buildings again is inextricably involved welding development. Some bridge builders are thinking in terms of streamlined bridge shapes. Sl building has hurdled most obstacles to speedy constr tion by cutting its bonds with tradition and embracing wholesale lots new techniques predicated upon prefab cation by welding.

Many new shapes—some built-up, some rolled— going into the record. In the manufacture of high spe lightweight trains; frames for agricultural equipment a materials handling units; switch cases, panels and ot electrical devices; jigs and fixtures, and in many ot fields the emphasis appears to be on more, not few special shapes. A whole new category of tubular sha —square, rectangular, etc.—must not be overlooked a comprehensive summary of important developments. all of these, the disposition of industry to adopt the lat methods of joining is significant.

Replies to STEEL's questionnaire bear out the theory further diversification. For example, the ships-cars-lo motives group shows 62.8 per cent in favor of an increa in the number of special shapes; agricultural equipme makers, 70.8 per cent; contractors' equipment, 72.7 p cent. Even office machinery manufacturers, restyling f greater efficiency, compactness and eye appeal, hope find a more generous selection of special shapes aft the war. A majority of 66.7 per cent is indicated.

A LIGHT TRUCK *for Heavy Duty!*

Twenty-five years of research and technical work have produced and perfected one of the finest small electric industrial trucks in the world today. Hundreds of manufacturers are using WRIGHT-HIBBARD trucks and are getting a maximum of service in a minimum of space. "WRIGHT" trucks are simply designed to facilitate all operation and will handle loads of from 2000 to 4000 lbs. with the greatest of ease and efficiency. All technical information and other data regarding the various types of trucks manufactured by WRIGHT-HIBBARD is at your disposal. We know we have a WRIGHT-HIBBARD truck to suit your requirements and will be happy to serve you. Write now for our catalog No. 6.

Visit our booth No. B-206 at The METAL SHOW

LOW LIFT TRUCKS

WRIGHT-HIBBARD type RBH-9, capacity for 2000 to 4000 lb. loads. Single motor operates both truck and platform on all models.

WRIGHT TRUCK

WRIGHT-HIBBARD
INDUSTRIAL ELECTRIC TRUCK CO.
INCORPORATED
PHELPS, NEW YORK

Postwar Products an

Over 90 per cent of plants will return to prewar products while nearly 40 per cent have developed new items. Peacetime employment prospects bright with most plants expecting to take on more workers or maintain current levels of employment

WHILE most plants will return to the products manufactured before the war, many of them expect to turn out items in many instances totally unrelated to their old lines and which will require an altogether different manufacturing procedure.

Take the case of a well-known maker of materials handling equipment planning to venture into the domestic appliance field with an electric iron. In designing the case for the new iron, this manufacturer requires a steel sheet with low heat conductivity which will take a fairly severe draw and which may be readily chromium plated. Problems involving both materials and processing thus are presented which were not previously experienced in making handling devices. And, this case is only one of many hundreds.

As a means of obtaining a better perspective of postwar tendencies in product manufacture and anticipated production levels, it is most revealing to study the information reported to STEEL by nearly 2000 metalworking plants. These data may be taken as representative for industry and indicate many changes are ahead in the individual channels in which materials will flow as well as promising a substantial market for equipment needed in setting up or revamping manufacturing facilities for new products.

Reference to the chart will reveal that 90.7 per cent of the plants will return to the products made prior to the war, 8.1 per cent will return partially and only 1.2 per cent will entirely abandon products previously made. It also will be noted that only 23.5 per cent of these plants have not developed new products or plan to do so. Conversely, 39.2 per cent actually have new products ready to go into production and an almost equal number, 37.3 per cent are thinking about some.

The first bar in the chart would make it appear that the shift from war to peace will be relatively painless for more than half of the plants since they are making the same products now as before the war. The actual proportion is 60.2 per cent compared with 28.8 per cent making some of the products previously manufactured. Only 11 per cent are making totally different products.

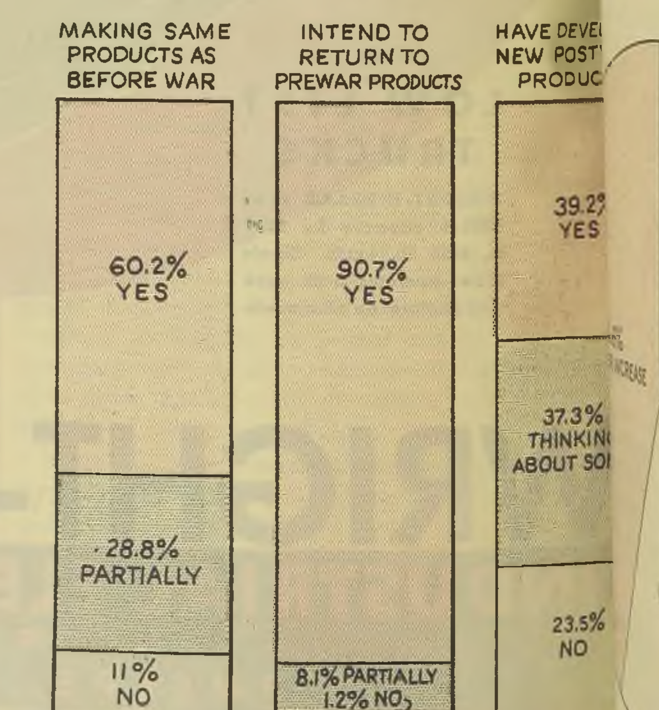
This picture changes considerably on examination of reports from plants of various size. In the over-1000 worker group, 53.1 per cent are making the same products as before the war but 15.5 per cent are making totally different products while 31.4 per cent are making some of the same products. The comparative figures are:

Number of Workers Employed	Making Same Products as Before War: Yes	No	Partially
	(Per Cent)		
Over 1000	53.1	15.5	31.4
1000-500	59.3	11.6	29
500-250	56.8	10.5	32
250-100	60.5	10.5	29
100-50	63.2	8.6	28
50-25	66.7	11.1	22
Under 25	57.9	12.9	29
Average All Plants	60.2	11.0	28

Again the picture changes when individual indust are examined. In the electrical appliance industry, as example, 42.8 per cent are making entirely different pr ucts and considerable reconversion is indicated. Ot industries where large segments are making altoget different products are: Ornamental and wrought i with 36 per cent, aircraft parts plants 22.6, auto tr bodies and trailers 21.7, metalworking machinery 2 structural fabricators 15 per cent, containers 19.6, au mobiles, trucks and tractors, 13.8. The figure for mach tool builders is only 1.2 per cent.

There is a slightly stronger tendency on the part of larger plants to return to prewar products. In the gr with more than 1000 workers, 93.1 per cent will go b to former products, 5.7 per cent intend to do so parti and only 1.2 per cent plan to switch to new produ

Postwar Products



Employment

The following table reflects the variance of opinion in the several groups:

Number of Workers Employed	Intend to Return to Prewar Products Yes	No (Per Cent)	Partially
Over 1000	93.1	1.2	5.7
1000-500	90.9	0	9.1
500-250	91.6	1.0	7.4
250-100	91.2	0.8	8.0
100-50	92.1	1.9	6.0
50-25	85.3	2.8	11.9
Under 25	88.8	0.8	10.4
Average All Plants	90.7	1.2	8.1

Out of 37 industries engaged in metalworking, 20 will return to prewar products entirely or in part. These include makers of screw machine products, plate fabricators, structural fabricators, makers of ornamental iron work and trim, track material manufacturers, builders of cars and ships and builders of metalworking machinery, automobiles, trucks, tractors, contractors equipment and agricultural implements, office machinery and recording instruments.

Some plants in a number of industries are not planning to go back to prewar products, including a few machine tool builders and makers of machine tool accessories, materials handling equipment, electrical equipment and appliances, industrial furnaces, containers, metal furniture and sheet, strip and wire products.

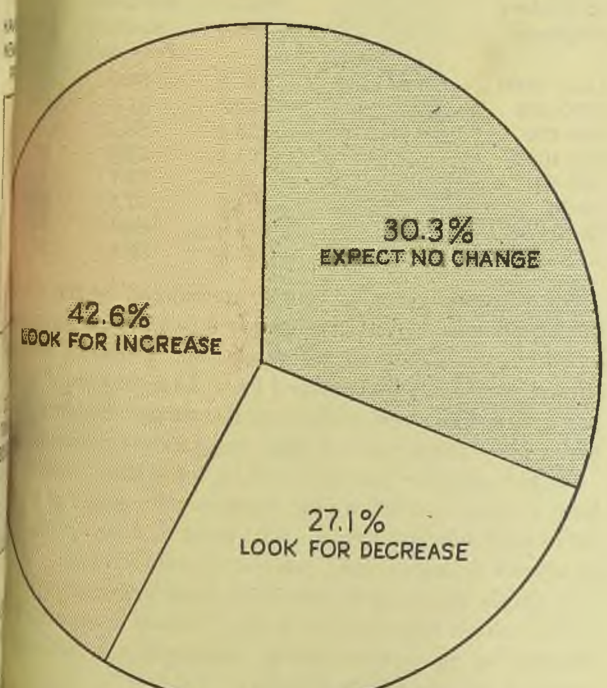
More postwar planning has been done among the larger companies, as will be noted by studying the table which follows:

Number of Workers Employed	Have Developed New Postwar Products Yes	No. (Per Cent)	Thinking About Some
Over 1000	48.7	15.8	35.5
1000-500	40.9	21.3	37.8
500-250	42.3	18.4	39.3
250-100	39.5	20.3	40.2
100-50	37.6	27.5	34.9
50-25	33.5	34.7	31.8
Under 25	30.9	32.9	36.2
Average All Plants	39.2	23.5	37.3

A postwar era of prosperity is in the offing if the expectations of manufacturers on employment prove to be correct. Of all plants, 42.6 per cent look for an increase, 30.3 per cent expect current levels will be maintained, while 27.1 per cent feel fewer workers will be required. The employment picture for postwar looks somewhat dimmer, however, when the returns for various employment groups are studied. By far the largest decline in employment may be expected among plants employing over 1000 workers. Anticipated declines are progressively smaller among the smaller plants.

Number of Workers Now Employed	—Postwar Employment— Look for Increase	Expect No Change (Per Cent)	Look for Decrease
Over 1000	19.9	21.2	58.9
1000-500	33.3	26.5	40.2
500-250	33.0	32.1	34.9
250-100	46.5	30.8	22.7
100-50	50.8	33.1	16.1
50-25	56.5	29.3	14.2
Under 25	55.5	34.2	10.3
Average All Plants	42.6	30.3	27.1

Postwar Employment



These charts may be interpreted with a considerable tinge of optimism. Postwar product planning has progressed to an advanced stage and employment prospects are favorable. Metal industry executives now feel more optimistic than earlier this year when similar data were presented (STEEL, March 20, 1944)

Subcontracting

Impetus given to purchase of parts and assemblies from outside sources will continue in peacetime period. Over half of plants will buy in same proportions

ONE of the principal reasons for the successful mobilization of industry of the United States for production of an unprecedented volume of war equipment in record time has been the extension of subcontracting on a scale which in ordinary times would be regarded as fantastic.

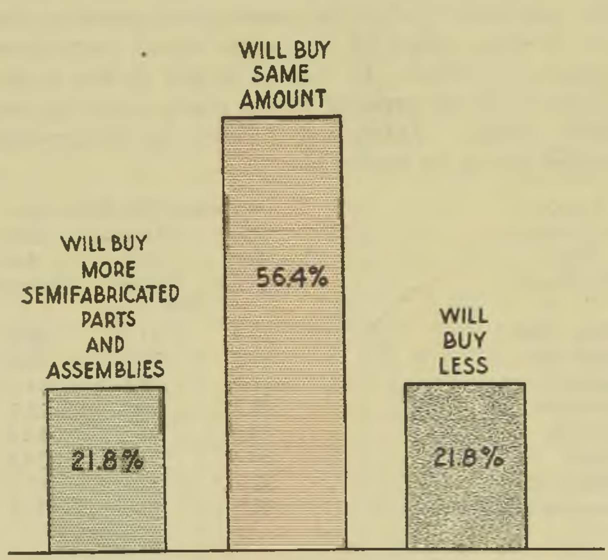
Under this system, it has been quite common for hundreds of plants, including many of the backyard variety, to pour parts and assemblies into a stream flowing to a single point for final erection into a single piece of equipment. In fact, over 90 per cent of the plants engaged in metalworking now are in some way involved as subcontractors, prime contractors or both.

Of course, industry does not expect to go to wartime extremes on subcontracting when its purchasing procedure is freed from government regulations. Nevertheless, the purchase of parts and assemblies from others will make sense after the war just as it did before it began. To take an extreme example, it is cheaper for a plant to purchase cotter pins from a company specializing in their production than to set up facilities for making the few thousand which might be requisitioned throughout the y

The reports of nearly 2000 companies to STEEL m it appear that purchase of semifabricated parts and semblies will be continued after the war on a very stantial basis. Of this group, which may be taken as resentative for the entire metalworking industry, 56.4 cent will buy the same amount. As for the remain there is a precise balance, with 21.8 per cent repor reduction and same percentage an increase.

It might be expected that the plants planning to chase more parts and assemblies would be numb among the larger companies. However, quite the rev is reported by them. Plants employing over 1000 wor include 18.1 per cent which will buy more, 24 per less and 57.9 per cent the same amount. In the sma group, employing less than 25 workers, 24 per cent buy more, 15.2 per cent less and 60.8 per cent the s amount. This probably can be explained by the large companies like those in the automotive field found it a wartime necessity to farm out work to than the usual number of suppliers. Detailed compar for the several groups follow:

Views on Subcontracting



A little more than half of the 1922 manufacturers indicate intention to hold subcontracting of parts and assemblies for their products at present levels. As for the remainder, chart above shows they are equally divided between increasing or decreasing this activity

	Semifabricated Parts and Assem		
Number of Workers Employed	Will Buy More	Will Buy Same Amount (Per Cent)	Will L
Over 1000	18.1	57.9	24
1000-500	19.2	51.0	29
500-250	23.4	55.4	2.
250-100	21.1	58.4	20
100-50	21.7	58.7	19
50-25	21.9	57.5	20
Under 25	24.0	60.8	15
Average All Plants	21.8	56.4	21

All of these figures, of course, are colored by the th ing of individual plants on outside purchases of parts assemblies. Makers of screw machine products, fo stance, would not be expected to be large buyers of t items and the same applies to locomotive builders mally performing most of their sub-fabrication work.

In the next few years, it will be interesting to obs how a new movement now beginning to germinate tie in with subcontracting. This involves mass produ in reverse whereby small, integrated units are set up in a single company to carry out manufacturing of i tical products from start to finish. Certain economie claimed for the system which, conceivably, would excellent use of outside suppliers.


ARMY
E
NAVY
MOORE RAPID
Lectromelt
FURNACES
★
Sizes 100 tons to 25 pounds
PITTSBURGH LECTROMELT
FURNACE CORPORATION
PITTSBURGH PENNA.

MOORE RAPID

Lectromelt

FURNACE DATA

Moore Rapid Lectromelt Furnaces are built in a wide range of standard sizes from 100 tons down to 25 pounds capacity. Almost all of the Lectromelt furnaces installed during the past few years have been of the top charge type. The top charge feature offers many advantages such as greater output due to decreased charging time, lower power and refractory costs, increased production per man hour, etc. Especially large pieces of scrap can be charged readily, and light fluffy scrap can be charged to shell height with a drop bottom bucket. In some of the very large sizes—frequently arranged for installation on an open-hearth platform—a door charge furnace may be used with the charging being handled by an open-hearth charging machine.

The following tables list some pertinent data on the various sizes of Lectromelt Furnaces:

TABLE I. These larger capacity furnaces are of the heavy, steel mill type and are generally used for ingot production.

Lectromelt Size	Nominal Size of Heat	Shell Diameter	Nominal Capacity of Substation
HT	75-100 Tons	20′-0″	15,000 kva
IT	60-75 Tons	19′-0″	15,000 kva
JT	50-60 Tons	18′-0″	12,000-15,000 kva
KT	40-50 Tons	17′-0″	10,000-12,000 kva
LT	30-40 Tons	16′-0″	8,750-10,000 kva
MT	25-30 Tons	15′-0″	7,500- 9,375 kva
NT	15-20 Tons	12′-4″	7,500- 9,375 kva
OT	8-12 Tons	11′-0″	6,000- 7,500 kva

TABLE II. The Lectromelt furnaces listed in this table are generally used in foundry work but many of these smaller furnaces are used in ingot shops for pouring billet size ingots or for tool steel.

Lectromelt Size	Usual Hourly Production Rate*	Usual Size of Heat**	Nominal Size of Substation
OPT	4½ Tons	8-9 Tons	3,000-3,750 kva
PT	3 Tons	5-6 Tons	2,000-2,500 kva
CQT	2 Tons	3½-4 Tons	1,000-2,000 kva
QT	1½ Tons	2½-3 Tons	1,200-1,500 kva
RT	1 Ton	2 Tons	800-1,000 kva
ST	1000 Pounds	1 Ton	400- 500 kva
TT	500 Pounds	1000 Pounds	300- 375 kva
UT	250 Pounds	500 Pounds	200- 250 kva

*On acid practice or single slag basic practice.

**The furnaces are so constructed that, when the occasion demands, especially large heats can be poured, considerably in excess of the "usual" heats listed.

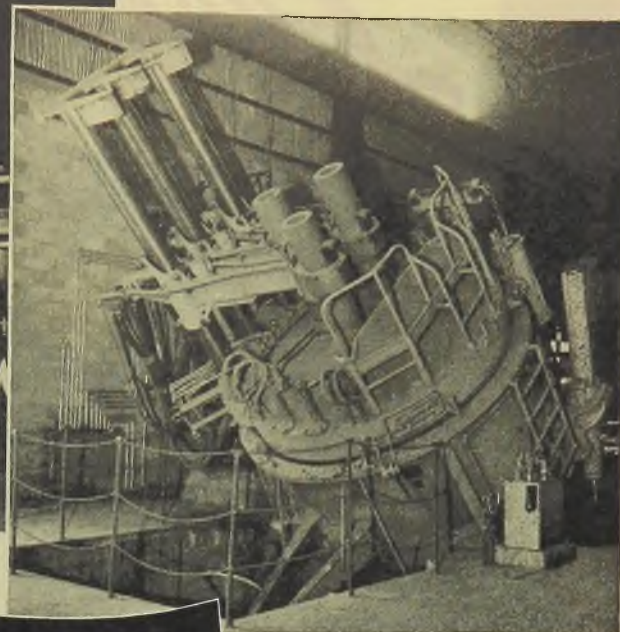
TABLE III. The Lectromelt furnaces listed in this table are intended primarily for laboratory and experimental use. These furnaces are for operation from a single phase supply.

Lectromelt Laboratory Sizes	Usual Size of Heat	KVA Rating
V	200-300 Pounds	100
VW	100 Pounds	100
W	50 Pounds	50
X	25 Pounds	37.5

PITTSBURGH LECTROMELT FURNACE CORP.

PITTSBURGH, PENNA.

A 75 ton, size "J" LECTROMELT furnace used on alloy steel production in a large eastern steel plant.



This size "OT" 10-ton LECTROMELT, shown in pouring position, has poured 15 tons in one heat.

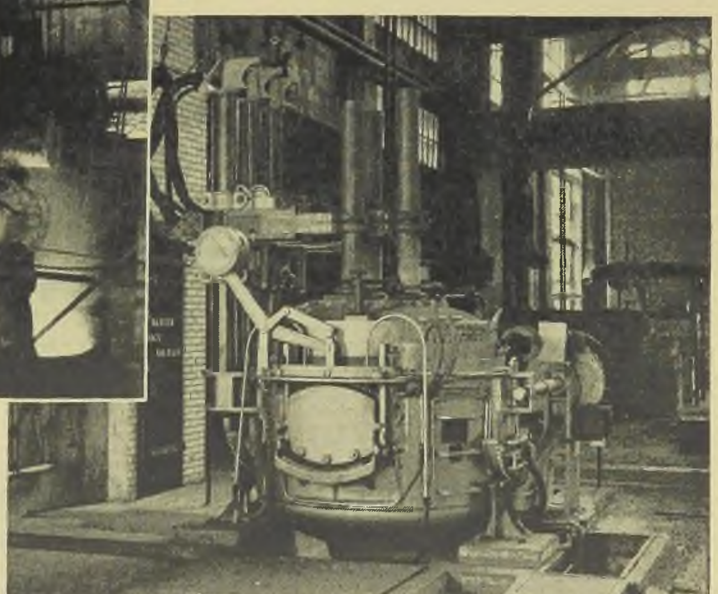
FROM 100 TONS to 25 POUNDS CAPACITY

MOORE RAPID Lectromelt FURNACES

Pittsburgh Lectromelt Furnace Corporation
Pittsburgh, Penna.

This "R" size unit is one of the most popular of the smaller capacity furnaces. It is used for one ton heats.

Tapping a heat of plain carbon steel from a size "KT" LECTROMELT furnace—one of the largest top charge electric furnaces in the United States.



Shift from War to Peace is incentive for getting most out of Metal Congress

TECHNICAL MEETINGS and EXHIBITS

THE 1944 National Metal Congress and War Confer-
e Display ranks as the most important in the 26-year
ory of the American Society for Metals since it comes
a time when emphasis in the metalworking industries
beginning to swing from production of materiel for
to peacetime products. While a large quantity of
ment will be required to terminate the war in the
East, contract cutbacks and terminations associated
the ending of the war in Europe mean that about
lf of the capacity engaged in producing materiel can
shifted to civilian products.

This shift in production requires a complete turnabout
the thinking of the industry. During the war period,
e has been the one vital element in production which
assumed paramount importance over cost and other
ctors. In making civilian products, primary considera-
on again must be given to costs and therefore to selec-
on of the materials and production methods which, in
ation, will result in products which may be sold in
competitive market.

ough industry has been under constant pressure
t out war goods, the element of time has been ac-
panied by an acceleration in technological developments involving both materials and processing methods which has been unsurpassed in any previous period. All these developments, such as NE steels, high strength aluminum alloys, composite stampings, precision casting, high speed machining, induction heating, sub-zero treatment, powder metallurgy and forging to close tolerances are carrying over into the postwar period.

The National Metal Congress and Display serves to bring engineers, metallurgists and production men up to date on recent developments in the metalworking industries in two ways—first, through the technical sessions of the societies participating in the Congress and second, through the exhibits of various manufacturers.

Programs and meeting places of the American Society for Metals, the American Welding Society, the Iron and Steel and Metals Divisions of the American Institute of Mining and Metallurgical Engineers, the American Industrial Radium and X-Ray Society and the Society for Experimental Stress Analysis are given on the following pages. It will be noted that information is being presented on practically every subject so that sessions of special interest may be selected. Reports on technical sessions will be published in subsequent issues of STEEL.

Panel Discussion Meetings — AMERICAN SOCIETY FOR METALS

Music Hall and Ballroom
Public Auditorium
CLEVELAND

Monday, Oct. 16

2:00 *P. M.—Metal Cutting and Tool Materials*

(Chairman and Panel to be announced.)
O. W. Boston, director, Department of Metal Processing, College of Engineering, University of Michigan, Ann Arbor, Mich., summarizer.

2:00 *P. M.—Light Weight Construction*

(Chairman and Panel to be announced.)

4:00 *P. M.—Surface Finishes and Protection*

James R. Ewing, assistant to the president, Solventol Chemical Products, Inc., Detroit, chairman.

Panel: George Onksen, manager of Industrial Engineering and Service, Solventol Chemical Products Inc., Detroit; P. J. Potter, executive vice president, Pangborn Corp., Hagerstown, Md.; J. H. Shoemaker, president, Kolene Corp., Detroit; Myron B. Diggin, chief chemist, Hanson-Van Winkle-Munning Co., Matawan, N. J.; R. B. Saltonstall, technical director, Udylite Corp., Detroit; Walter Meyer, technical director, Enthone Co., New Haven, Conn.; R. M. Thomas, vice president, Rheem Research Products, Baltimore.

4:00 *P. M.—Refrigeration in Metallurgy*

J. R. Tranter, president, Kold-Hold Mfg., Lansing, Mich., chairman.

Panel: L. L. Lewis, vice president Carrier Corp., Syracuse, N. Y.; and others.

8:30 *P. M.—Induction Heating*

Chairman to be announced; H. E. Somes, chief engineer, Budd Induction Heating Inc., Detroit, summarizer.

Panel: J. P. Jordan, Industrial Heating and Welding Engineering Department, General Electric Co., Schenectady, N. Y.; Howard F. Taylor, metallurgist, Naval Research Laboratories, Anacostia, Washington, D. C.; C. M. Campbell, metallurgist, Chevrolet Parts Co., Detroit; Anthony M. Setapen, Industrial Engineering Division, Handy & Harman, New York; Eugene W. Mittlemann, director of electronic research, Illinois Tool Works, Chicago; and others.

8:30 *P. M.—What's New in the Study of Corrosion*

(Roundtable Discussion)

Dr. Robert B. Mears, chief, Chemical Metallurgy Division, Aluminum Research Laboratories, New Kensington, Pa., leader.

Speakers: Russell Franks, Union Carbide & Carbon Research Laboratory, New York; F. L. La Que, Development and Research Division, International Nickel Co., New York; and others.

Tuesday, Oct. 17

2:00 *P. M.—The Hardenability Band as a Basis for Purchase and Use of Steel*

Walter E. Jominy, chief metallurgist, Dodge Chicago Plant, Chrysler Corp., Chicago, chairman; Dr. Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp., Pittsburgh, summarizer.

Panel: John Mitchell, metallurgical engineer, alloy, Carnegie-Illinois Steel Corp., Pittsburgh; A. L. Boegehold, head, Metallurgical Division, General Motors Research Corp., Detroit.

2:00 *P. M.—Magnesium*

(Chairman and Panel to be announced.)

4:00 *P. M.—Surface Peening to Increase Fatigue Resistance*

Maurice Olley of Detroit, chairman; Dr. Oscar E. Harder, assistant director, Battelle Memorial Institute, Columbus, O., summarizer.

Panel: Maurice Olley, Detroit; F. P. Zimmerli, chief engineer, Barnes-Gibson-Raymond Division of Associated Spring Corp., Detroit; L. L. Andrus, vice president in charge of sales, American Foundry Equipment Co., Mishawaka, Ind.; and others.

4:00 *P. M.—Instruments for Quality Control*

Dr. O. W. Boston, director, Department of Metal Processing, College of Engineering, University of Michigan, Ann Arbor, Mich., chairman; A. H. d'Arcambal, vice president, Pratt & Whitney, Hartford, Conn., summarizer.

Panel: H. D. Hiatt, superintendent, gage department, Allison Engineering Division, General Motors Corp., Indianapolis; E. F. Stoecker, methods, Tool and Planning Equipment Division, General Electric Co., Schenectady, N. Y.; and others.

8:30 *P. M.—Tin, Tin Alloys and Tin Coatings*

Chairman to be announced; Bruce W. Gonser, Battelle Memorial Institute, Columbus, O., summarizer.

Panel: Walton Smith, vice president, Metal & Thermit Corp., New York; Harley S. Van Vleet, metallurgical engineer, American Can Co., New York; and others.

8:30 *P. M.—National Emergency Steels and Hardenability Specifications from the Consumer's Viewpoint*

Dr. Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa., chairman.

Panel: Glen C. Riegel, chief metallurgist, Caterpillar Tractor Co., Peoria, Ill.; J. T. Jarman, chief metallurgist and chemist, Allis-Chalmers Mfg. Co., Milwaukee; and others.

Wednesday, Oct. 18

2:00 *P. M.—New Trends in Metallurgical Heating*

G. George Segeler, American Gas Association, New York, chairman.

Panel: C. H. Carpenter, sales engineer, Lee Wilson Engineering Co., Cleveland; Harry W. Smith Jr., manager, Technical Information Department, Selas Corp. of America, Philadelphia; Slade Gamble, Lindberg Engineering Co., Chicago; Philip T. Stroup, research metallurgist, Aluminum Co. of America, Pittsburgh; G. E. Stoltz, manager, Metal Working Section, Industrial Engineering Department, Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.; and others.

2:00 *P. M.—Metals for Railroads*

William M. Barr, chief chemical and metallurgical engineer, Union Pacific Railroad Co., chairman.

Panel: R. E. Cramer, metallurgist, Rails Investigation; special research assistant professor of engineering materials, University of Illinois, Champaign, Ill.; Oscar J. Horger, in charge of railway engineering and research, Timken Roller Bearing Co., Canton, O.; Ray McBrian, engineer of standards and research, Denver & Rio Grande Western Railroad; Paul L. Irwin, engineer of tests, Baldwin Locomotive Works, Eddystone, Pa.; Prof. W. M. Murray, Massachusetts Institute of Technology, Boston; J. R. Jackson, engineer of tests, Missouri Pacific Lines; and others.

4:00 *P. M.—Products From Metal Powders*

Charles Hardy, president, Hardy Metallurgical Co., New York, chairman.

Panel: A. B. Gibson, Gibson Electric Co., Pittsburgh; C. C. Balke, research chemist and metallurgist, Fansteel Metallurgical Corp., No. Chicago, Ill.; Andrew J. Langhammer, president, Amplex Division, Chrysler Corp., Detroit; Edgar W. Engle, consulting metallurgist, Carboloy Co. Inc., Detroit; and others.

4:00 *P. M.—Instruments for Quality Control*

(Means for Establishing Identity)

Chairman to be announced; John G. Thompson, chief of Chemical and Me[tallurgical] Section, United States De[partment] of Commerce, Washingto[n], summarizer.

Panel: Antony Doschek, metallurgic[al] engineer, American Tubular Elevat[or] Co., Pittsburgh; W. O. Philbrook, for[e]man, metallurgical division, Wisco[n]sin Steel Works of International Ha[r]vester Co., Chicago; and others.

8:30 *P. M.—Instruments for Quality Control*

(Detection and Measurement of Internal Defects)

Panel: W. E. Habig, sales engine[er,] Sperry Products Inc., Hoboken, N. [J.;] Theodore Zuschlag, Magnetic Ana[ly]sis Corp., Long Island City, N. [Y.;] L. W. Ball, Triplett & Barton, B[ur]bank, Calif.; Floyd A. Firestone, [as]sistant professor of physics, Univer[sity] of Michigan, Ann Arbor, Mich.; [Al]fred V. deForest, professor of [me]chanical engineering, Massachus[etts] Institute of Technology, Boston; H[ud]son T. Morton, chief metallurg[ist,] Hoover Ball & Bearing Co., Ann [Ar]bor, Mich.; and others.

8:30 *P. M.—Manufacture of Quality Steels*

C. D. King, chairman of Opera[ting] Committees, United States Steel C[o.] of Delaware, Pittsburgh, chairma[n].

Panel: W. G. Bischoff, metallurgist [as]sistant, Timken Steel & Tube D[ivi]sion of Timken Roller Bearing [Co.,] Canton, O.; F. M. Washburn, su[per]intendent of testing, Wisconsin S[teel] Works, Chicago; and others.

Thursday, Oct. 19

2:00 *P. M.—New Aluminum Alloys for Peacetime Uses*

Chairman to be announced; Edgar Dix Jr., assistant director of resea[rch] and chief metallurgist, Aluminum [Re]search Laboratories, Aluminum Co. [of] America, New Kensington, Pa., su[m]marizer.

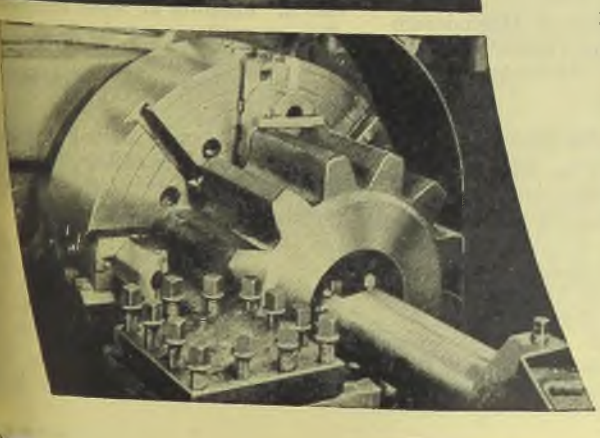
Panel: Theodore W. Bossert, chief m[et]allurgist, Fabricating Division, Alu[mi]num Co. of America, Pittsbur[gh;] Hiram Brown, chief chemist, Front[ier] Bronze Corp., Niagara Falls, N. [Y.;] and others.

2:00 *P. M.—Salt Baths*

Haig Solakian, vice president, A. [F.] Holden Co., New Haven, Conn., cha[ir]man; Leon D. Slade, superintende[nt,] Gleason Works, Rochester, N. Y., su[m]marizer.

Panel: A. E. Bellis, president, Be[llis] Heat Treating Co., Branford, Con[n.;] Paul C. Farren, Springfield He[at] Treating Co.; Warren A. Sillima[n,] chief metallurgist, Cleveland Trac[tor] Co., Cleveland; Arnold P. Seashol[tz,] metallurgical engineer, E. F. Hou[ghton]


KENNAMETAL



ton Co., Philadelphia; and others.

4:00 *P. M.—Quality Control by Statistical Methods*

(Chairman and Panel to be announced.)

4:00 *P. M.—Instruments for Quality Control*

(Measuring Devices for Atmosphere and Combustion)

C. E. Peck, engineer, Heating Section, Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., chairman.

Panel: J. F. Luhrs, Bailey Meter Co., Cleveland; P. K. Kinyoun, combustion engineer, Bethlehem Steel Corp., Bethlehem, Pa.; and others.

Friday, Oct. 20

2:00 *P. M.—Heat Treatment*

Dr. E. C. Bain, vice president, Carnegie-Illinois Steel Corp., Pittsburgh, chairman.

Panel: Peter Payson, assistant director of research, Crucible Steel Co., New York; C. A. Liedholm, chief engineering metallurgist, Propeller Divisi Curtiss-Wright Corp., Clifton, N. B. F. Shepherd, chief metallurg Ingersoll-Rand Co., Chicago; Fl Harris, furnace engineer, Buick Mo Co., Flint, Mich.; E. G. de Coric Surface Combustion, Toledo, O.

2:00 *P. M.—Improved Gray Iron Castings*

Chairman to be announced.

Panel: John Erler, chief metallur Farrel - Birmingham Co., Anso Conn.; and others.

Technical Program — AMERICAN SOCIETY FOR METALS — Hotel Statler CLEVELAND

Monday, Oct. 16—9:30 A. M.

Surface Hardening

"Practical Aspects of the Selection of Frequency and Time Cycles for the Processing of Metallic Parts With Induction Heating," by W. E. Benningoff and H. B. Osborn Jr., Ohio Crankshaft Co., Cleveland.

"Induction Hardening of Plain Carbon Steels," by D. L. Martin and F. E. Wiley, General Electric Co., Schenectady, N. Y.

"Shot for Metal Peening," by O. E. Harder and J. T. Gow, Battelle Memorial Institute, Columbus, O.

Hardenability

"Rates of Tempering in Cobalt Steels," by E. A. Loria, Carnegie-Illinois Steel Corp., Pittsburgh.

"Isothermal Transformation and End-Quench Hardenability of Some NE Steels," by R. L. Rickett, J. G. Cutton, C. B. Bernhart Jr., and J. R. Millikin, United States Steel Corp., Pittsburgh.

"Further Developments of the End-Quenched Hardenability Test," by C. R. Wilks, Earnshaw Cook and Howard S. Avery, American Brake Shoe Co., New York.

"A Hardenability Test for Low Carbon and Shallow Hardening Steels," by O. W. McMullan, Youngstown Sheet & Tube Co., Youngstown, O.

Nonferrous Metals

"A Survey of Wrought Magnesium Alloy Fabrication," by J. V. Winkler, Dow Chemical Co., Midland, Mich.

"The Copper-Manganese Equilibrium System," by R. S. Dean, J. R. Long, T. R. Graham, E. V. Potter and E. T. Hayes, Bureau of Mines, Washington.

"Properties of Transitional Structure in Copper-Manganese Alloys," by R. S. Dean, E. V. Potter and J. R. Long, Bureau of Mines, Washington.

"Age Hardening Copper-Manganese-Nickel Alloys," by R. S. Dean, J. R. Long, T. R. Graham and C. W. Matthews, Bureau of Mines, Washington.

11:30 A. M.—Victory Session

Tuesday, Oct. 17—9:30 A. M.

Physical Properties

"The Mechanism of Failure of 18 Cr, 8 Ni Cracking Still Tubes," by C. L. Clark, Timken Roller Bearing Co., Canton, O., and J. W. Freeman, University of Michigan, Ann Arbor, Mich.

"Capillarity of Metallic Surfaces," by E. R. Parker, University of California, and R. Smoluchowski, General Electric Co., Schenectady, N. Y.

"The Effect of Fiber on Notched Bar Tensile Strength Properties of a Heat Treated Low Alloy Steel," by G. Sachs, J. D. Lubahn, L. J. Ebert and E. L. Aul, Case School of Applied Science, Cleveland.

"The Effects of Notches of Varying Depth on the Strength of Heat Treated Low Alloy Steels," by G. Sachs, J. D. Lubahn and L. J. Ebert, Case School of Applied Science, Cleveland.

Hardenability

"The Effect of Carbon Content on Hardenability," by E. S. Rowland, J. Welchner, R. G. Hill and J. J. Russ, Timken Roller Bearing Co., Canton, O.

"Air Hardenability of Steels," by C. B. Post, M. C. Fetzer and W. H. Fenstermacher, Carpenter Steel Co., Reading, Pa.

"The Partition of Molybdenum in Steel and Its Relation to Hardenability," by Fred E. Bowman, Climax Molybdenum Co., New York.

"The Rate of Diffusion of Molybdenum in Austenite and in Ferrite," by John L. Ham, Climax Molybdenum Co., New York.

Aluminum and Magnesium Alloys

"New Developments in High Strength Aluminum Alloy Products," by E. H. Dix Jr., Aluminum Co. of America, Pittsburgh.

"Aluminum Alloy Forging Materials and Design," by L. W. Davis, Aluminum Co. of America, Pittsburgh.

"The Properties of Aluminum Alloys Melted in an Induction Heated Crucible Furnace," by James W. Poynter, Army Air Forces, Wright Field, ton, O.

"Magnesium Sheet," by P. T. St and G. F. Sager, Aluminum Co America, and J. B. West, Amer Magnesium Corp., Cleveland.

11:30 A. M.—Victory Session

Wednesday, Oct. 18

7:30 A. M.—Chapter Chairmen Breakfast

9:30 A. M.—Annual Meeting of t American Society for Metals

Ballroom, Hotel Statler

Edward de Mille Campbell Mem Lecture, by G. R. Fitterer, Prof and Head, Department of Meta gical Engineering, University of burgh, Pittsburgh.

12:00 M.—Canadian Luncheon

Thursday, Oct. 19—9:30 A. M.

Melting and Special Alloys

"A Comparison of Aluminum and Ti ium Deoxidation for Preventing St Aging Embrittlement in Low Ca Steel," by G. F. Comstock and J Lewis, Titanium Alloy Mfg. Co., agara Falls, N. Y.

"The Ar' Reaction in Some Iron-Co Tungsten Alloys and the Same M fied With Chromium," by W. P. Sy General Electric Co., Schenect N. Y.

"The Basic Electric Melting Proce for High Quality Alloy Steels," A. L. Ascik, Sorel Industries, I Sorel, Que.

Tool Steel

"The Dimensional Stability of Stee Part I—Subatmospheric Transfor tion of Retained Austenite," by S. Fletcher and Morris Cohen, Ma

USE THIS FREE-FLOWING ALLOY
IN ANY TYPE OF BRAZING

To Eliminate Extra Operations

Phos-Copper brazing eliminates extra machining and finishing operations with any type of brazing . . . gas, incandescent carbon, dip, induction heating, or electric furnace . . . for any kind of joint, either butt, scarf, lap or shear.

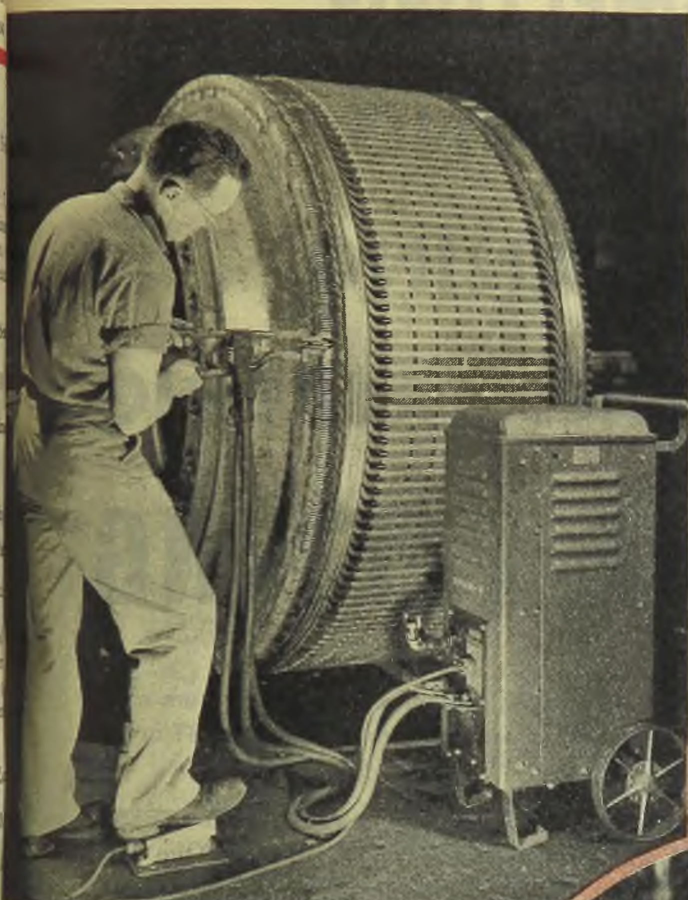
No flux is needed on most copper brazing, and complicated jigs and fixtures are unnecessary. Very little Phos-Copper is needed to produce a strong, uniform joint, and its low free-flowing temperature (1382° F.) speeds assembly operations.

Nearly every phase of manufacturing, installation or maintenance work can use Phos-Copper at lower cost with better, faster results than expensive silver solders or high-temperature alloys.

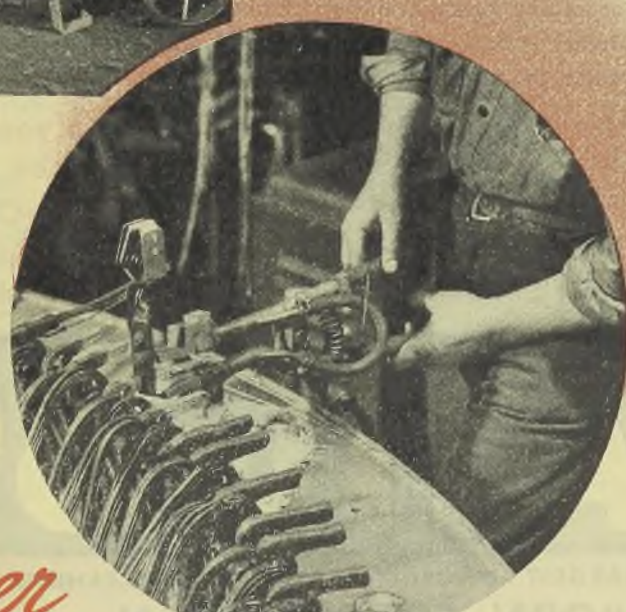
Joints of high electrical conductivity are produced with Phos-Copper, and corrosion resistance, uniformity and excellent penetration contribute to its many advantages. Tests have shown Phos-Copper to have greater strength and vibration resistance than 20% silver solder.

Phos-Copper is available now in rod, ribbon and special shapes for immediate delivery. Get complete information on Phos-Copper from your nearest Westinghouse office. Or write Westinghouse Electric & Manufacturing Company, P. O. Box 868, Pittsburgh 30, Pa.

J-90544



A portable unit is used here to braze armature leads with tops of commutator riser. In a similar application, one electrical manufacturer saved 3,750 pounds of critically scarce tin on one motor contract by switching from soldering to Phos-Copper brazing . . . and cut costs by more than 75%!



Brazing generator stator with Phos-Copper, using incandescent carbon method. So little Phos-Copper is needed to produce a strong, uniform joint that extra machining and finishing operations are not necessary.

Westinghouse
PLANTS IN 25 CITIES ... OFFICES EVERYWHERE

Phos-Copper

chusetts Institute of Technology, Boston.

Study of Subzero Treatments Applied to Molybdenum-Tungsten High Speed Steel," by R. G. Kennedy Jr., Cleveland Twist Drill Co., Cleveland.

xperiments of Sodium Cyaniding of High Speed Steel Prior to Hardening," by John McIntyre, International Business Machines Co., New York.

Radiography and Testing

Comparison of Microhardness Indentation Tests," by Douglas R. Tate, National Bureau of Standards, Washington.

mproved Sensitivity in Double Exposure Radiography," by James Rigbey, Ford Motor Company of Canada, Ford, Ont.

he Interpretation of Radiographs: Particularly of Aircraft Parts," by Leslie W. Ball, Triplett & Barton Inc., Burbank, Calif.

11:30 A. M.—**Victory Session**

M. — **College Alumni Luncheons**

P. M.—**Annual Dinner of the American Society for Metals**
Ballroom, Hotel Statler

Friday, Oct. 20—9:30 A. M.

Chromium and Molybdenum Alloys

"Chromium Steels of Low Carbon Content," by Russell Franks, Union Carbide and Carbon Research Laboratories, New York.

"Characteristics and Properties of Some Cast Chromium-Molybdenum Steels," by N. A. Ziegler and W. L. Meinhart, Crane Co., Chicago.

"The Segregation of Molybdenum in Phosphorus Bearing Alloyed Gray Cast Iron," by F. B. Rote, Wyman-Gordon Co., Detroit, and W. P. Wood, University of Michigan, Ann Arbor, Mich.

Fracture and Grain Size

"Fractography—A New Tool for Metallurgical Research," by Carl A. Zapffe and Mason Clogg Jr., Rustless Iron & Steel Corp., Baltimore.

"Cleavage Structures of Iron-Silicon Alloys," by Carl A. Zapffe and Mason Clogg Jr., Rustless Iron & Steel Corp., Baltimore.

"Grain Shape and Grain Growth," by David Harker, General Electric Co., and Earl R. Parker, University of California.

"Fracture Studies of Soldered Joints," by F. Berman and R. H. Harrington, General Electric Co., Schenectady, N. Y.

Rolling and Graphitization

"Annealing Studies on Cold-Rolled Iron and Iron Binary Alloys," by C. R. Austin, L. A. Luini and R. W. Lindsay, Pennsylvania State College, State College, Pa.

"The Effect of Cold Rolling on the Structure of Hadfield Manganese Steel," by Norman P. Goss, Cold Metal Products Co., Youngstown, O.

"Factors Controlling Graphitization of Carbon Steels at Subcritical Temperatures," by C. R. Austin, Pennsylvania State College, State College, Pa., and M. C. Fetzer, Carpenter Steel Co., Reading, Pa.

Technical Program

AMERICAN WELDING SOCIETY

Hotel Cleveland
CLEVELAND

Monday, Oct. 16, 9:30 A.M.

hairman — David Arnott, president, American Welding Society, New York.

ice-chairman—E. V. David, chairman, Convention Committee.

ntation of medals and prizes.

Welding Aids the War Effort

ing as an Aid in Shipbuilding Construction", by Admiral H. L. Vickery, United States Maritime Commission, Washington.

ing as an Aid in the Fabrication of Ordnance Equipment", by Col. S. B. Ritchie, Office, Chief of Ordnance, Washington.

elding in Aircraft Construction", by W. B. Stout, Consolidated Vultee Aircraft Corp., San Diego, Calif.

2:00 P.M.

ing and Cutting in Heavy Industries

airman—R. J. Yarrow, Republic Structural Iron Works, Cleveland.

chairman—J. M. Driscoll, Air Reduction Sales Co., New York.

amentals of Heavy Cutting", by L. Walker and H. G. Hughey, Air Reduction Sales Co., New York.

Mill Maintenance", by E. W. aber, Wheeling Steel Corp., Wheeling, W. Va.

ial Applications of Gas Cutting in Ordnance Fabrication", by C. M. Underwood, Northern Ordnance Inc., Minneapolis.

"Procedure Control of Automatic Welding Processes", by A. E. Bedell and J. B. Quigley, Graver Tank & Mfg. Co. Inc., Chicago.

Railroad and Transportation

Chairman—J. W. Sheffer, American Car & Foundry Co., New York.

Vice-chairman—A. G. Oehler, *Railway Age.*

"Welding of Aluminum Tank Cars", by A. H. Woollen, railroad sales, Aluminum Co. of America, Pittsburgh.

"Railroad Welding", by John McMullen, Erie Railroad, Cleveland.

Weldability

Chairman—A. B. Kinzel, Union Carbide & Carbon Corp., New York.

Vice-chairman—C. H. Jennings, Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

"Welding of Manganese Steels", by W. B. Brooks and A. G. Waggoner, Cramp Shipbuilding Co., Philadelphia.

"High Tensile Manganese-Silicon Steels for Welded Fabrication", by G. G. Luther and F. H. Laxar, Naval Research Laboratory, Anacostia, Washington, D. C.

"The Bead-Weld Nick-Bend Test for Ductility", by C. E. Jackson and G. G. Luther, Naval Research Laboratory, Anacostia, Washington, D. C.

"The Influence of Minor Variables of Weldability", by R. D. Stout, S. S. Tor and G. E. Doan, Lehigh University, Bethlehem, Pa.

8:00 P.M.

Adams' Lecture

Chairman—Wendell F. Hess, Rensselaer Polytechnic Institute, Troy, N. Y.

Vice-chairman—R. H. Aborn, United States Steel Corp., Pittsburgh.

"Solid Phase Welding", by A. B. Kinzel, Union Carbide & Carbon Corp., New York.

Tuesday, Oct. 17—9:30 A. M.

Resistance Welding

Chairman—L. C. Bibber, Carnegie-Illinois Steel Corp., Pittsburgh.

Vice-chairman—G. N. Sieger, S.M.S. Corp., Detroit.

"Spot Welding Machines for Heavy Gages of Ferrous and Nonferrous Metals", by Mario Sciaky, Sciaky Bros., Chicago.

"Heat Transfer Across Contact Surfaces", by W. B. Kouwenhoven, dean, School of Engineering, Johns Hopkins University, Washington.

"Problems in Spot Welding Heavy Mild Steel Plate", by F. R. Hensel, E. I. Larsen and E. F. Holt, P. R. Mallory & Co. Inc., Indianapolis.

Research

Chairman—S. L. Hoyt, Battelle Memorial Institute, Columbus, O.

Vice-chairman—R. E. Kinkead, consulting welding engineer, Cleveland.

"The Effect of Postheating in Welding Medium Alloy Steels", by M. A. Pugacz and G. J. Siegel, Naval Research Laboratory, Anacostia, Washington, D. C.

"Stress Relieving Study", by Prof. J. R. Stitt, Ohio State University, Columbus, O.

"The Effects of Metallurgical Changes Due to Heat Treatment Upon the Fatigue Strength of Carbon-Steel Plates", by W. H. Bruckner, and W. H. Munse, University of Illinois, Champaign, Ill.

Structural

Chairman—A. S. Low, Austin Co., Cleveland.

Vice-chairman—J. F. Maine, Republic Structural Iron Works, Cleveland.

"Standard Details for Welded Building Construction", by H. W. Lawson, Bethlehem Steel Co., Bethlehem, Pa.

"Field Welded Pressure and Variable Volume Storage Tanks", by Fred L. Plummer, Hammond Iron Works, Warren, Pa.

2:00 P.M.
Resistance Welding

Chairman—R. E. Powell, Western Electric Co., New York.

Vice-chairman—H. C. Cogan, National Electric Welding Machines Co., Bay City, Mich.

"Low Reactance Cable for Portable Resistance Welders", by Myron Zucker, Mackworth G. Rees Inc.

"The Flash Welding of Alloy Steels—Welding Techniques and Variables", by J. J. Riley; "Metallurgical and Physical Characteristics", by J. C. Barrett, Taylor-Winfield Corp., Warren, O.

"Small Portable Condenser Welding Set", by E. M. Callender, E. G. Budd Mfg. Co., Philadelphia.

Research

Chairman—H. C. Boardman, Chicago Bridge & Iron Co., Chicago.

Vice-chairman—G. V. Slottman, Air Reduction Sales Co., New York.

"Some Recent Developments in Stainless Steel Welding", by D. L. Mathias, Metal & Thermit Corp., New York.

"Bi-Axial Fatigue Strength of Low-Carbon Steels", by George K. Morikawa and LeVan Griffis, Illinois Institute of Technology, Chicago.

"Intergranular Corrosion of Stainless Steel Welds", by Wm. T. Tiffin, University of Oklahoma.

"Weldability Tests of Cast Steel", by C. E. Jackson and F. S. McKenna, Naval Research Laboratory, Anacostia, Washington, D. C.

Ships

Chairman—J. L. Wilson, American Bureau of Shipping, Washington.

Vice-chairman—S. A. Midnight, American Shipbuilding Co., Cleveland.

"Controls Required for Safe and Economical Construction of Welded Ships", by D. G. Maxson, Welding Consultant, Marinship Corp.

"Technical Control of Welding in Ship Construction", by M. H. MacKusick, California Shipbuilding Corp., Los Angeles.

"Evolution of Welding in Shipbuilding", by M. N. Maltseff, Western Pipe & Steel Co., San Francisco.

"Multiple and Stack Machine Cutting", by A. H. Yoch, Air Reduction Sales Co., New York.

8:00 P.M.
University Research Conference

Wednesday, Oct. 18, 9:30 A.M.
Aircraft

Chairman—G. S. Mikhalapov, National Research Council, Chicago.

Vice-chairman—C. W. Dodge, Sciaky Bros., Chicago.

"Impact Strength of Arc Welded Joints in Aircraft Steel", by H. O. Klinke, Republic Aviation Corp., Long Island, N. Y.

"Helium Shielded Arc Welding of Exhaust Collector Rings", by Francis H. Stevenson, Lockheed Aircraft Corp., Burbank, Calif.

"Multi-Arc Welding of Aluminum Alloys", by M. R. Rivenburgh and C. W. Steward, Curtiss-Wright Corp., Paterson, N. J.

Research

Chairman—Isaac Harter, the Babcock & Wilcox Co., New York.

Vice-chairman—E. R. Seabloom, Crane Co., Chicago.

"Weldability—as-Rolled vs. Heat-Treated High Strength Constructional Steels" by Lieut. S. A. Herres and W. L. Warner, Watertown Arsenal, Springfield, Mass.

"The Effect of Time and Temperature on the Relief of Residual Stresses in Low Alloy Steels", by J. K. McDowell and Paul C. Cunnick, Lieut. Col., Ordnance Dept., Rock Island Arsenal, Rock Island, Ill.

"Development and Application of Modern Heavy Coated Arc Welding Electrodes", by D. C. Smith and W. G. Rinehart, Harnischfeger Corp., Milwaukee.

2:00 P.M.
Aircraft

Chairman—G. O. Hoglund, Aluminum Co. of America.

Vice-chairman—E. S. Jenkins, Curtiss-Wright Research Laboratory, Paterson, N. J.

"The Geometry of a Spot Welding Tip and Its Relation to Tip Life", by E. D. Crawford and C. W. Steward, Curtiss-Wright Corp., Paterson, N. J.

"Survey of Chemical Cleaning Practices for Spot Welding Aluminum Alloys", by F. M. Morris, Kaiser Cargo, Inc., Fleetwings Division, Bristol, Pa.

"An Evaluation of Process Control of Aircraft Welding", by P. H. Merriman, Glenn L. Martin Co., Baltimore.

"Characteristics of Welding Arcs on Aluminum in Atmospheres of Helium and Argon", by F. A. Wassell, General Electric Co., Schenectady, N. Y.

Machinery

Chairman—A. E. Gibson, Wellman Engineering Co., Cleveland.

Vice-chairman—R. J. Kriz, James H. Herron Co., Cleveland.

"Production Problems and Production Control", by E. C. Brekelbaum, Harnischfeger Corp., Milwaukee.

"Routine Inspection and Salvage of Machinery Weldments—Rough, Partially Machined and Machined", by James W. Owens, Fairbanks, Morse & Co., Beloit, Wis.

"Welded Jigs and Fixtures", by A. N. Kugler, Air Reduction Sales Co., New York.

"Design of Welded Machinery", by John Mikulak, Electric Machinery Manufacturing Co., Minneapolis.

Piping and Pressure Vessels

Chairman—A. C. Weigel, Combustion Engineering Co., New York.

Vice-chairman—R. W. Emerson, Pittsburgh Piping & Equipment Co., Pittsburgh.

"Pressure Vessel Welding", by Edward B. McGuire, Hamler Boiler & Tank Co., Chicago.

"Normalizing of Welds in Carbon-Molybdenum Pipe by 60-Cycle Induction Heating", by I. A. Rohrig and D. H. Corey, Detroit Edison Co., Detroit.

"Properties of Welded Joints Between Dissimilar Metals," by E. C. Chapman and R. E. Lorentz, Combustion Engineering Co., New York.

"Oxy-Acetylene Pressure Welding", by A. R. Lytle, Union Carbide & Carbon Research Laboratories, New York.

6:30 P.M.
Section Officers Dinner and Conference

Thursday, Oct. 19, 9:30 A.M.
Foundry

Chairman—L. A. Danse, Cadillac Motor Car Division General Motors Corp., Detroit.

Vice-chairman—Austen J. Smith, Lunkenheimer Co., Cincinnati.

"Arc Welding Practices in the Steel Foundry", by Frank Kiper and Lawrence Gabes, Ohio Steel Foundry, Lima, O.

"Machine Cutting of Risers, Flame Scarfing to Remove Padding, and Flame Gouging to Remove Webs and Defects", by G. E. Bellew, Air Reduction Sales Co., New York.

"Repair of Castings", by L. A. Danse, Chairman, G. M. Metallurgical Committee, General Motors Corp., Detroit.

Miscellaneous

Chairman—W. E. Crawford, A. O. Smith Corp., Milwaukee.

Vice-chairman—A. L. Pfeil, Universal Power Corp., Cleveland.

"Low Temperature Joining", by W. D. Wasserman and C. E. Swift, Eutectic Welding Alloys Co., New York.

"A Method for Measuring the Bond Strength of Sprayed Metal Coatings", by Kenneth Wilson, Metallizing Engineering Co., Long Island City, N. Y.

"How Much Ductility Is Necessary for Structure or Machine?", by W. J. Conley, Lincoln Electric Co., Cleveland.

2:00 P.M.

Business Meeting

3:00 P.M.

Board of Directors Meeting

Technical Program

IRON AND STEEL AND INSTITUTE OF METALS DIVISIONS

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS

Hotel Statler

CLEVELAND

Monday, Oct. 16

10:30 A. M.—Euclid Room, Hotel Statler

Magnesium

"The Relationship Between Magnesium Core Sand Mixtures and the Burning of Magnesium," by O. J. Myers, Wright Aeronautical Co., Paterson, N. J.

"Solubility of Manganese in Magnesium," by N. Tiner, Permanente Metals Corp., Permanente, Calif.

2:00 P. M.

Grain Size of Magnesium

"Grain Size and Properties of Sand Cast Magnesium," by R. S. Busk and C. W. Phillips, Dow Chemical Co., Midland, Mich.

"Factors Affecting Grain Growth in Germination of Magnesium Alloy Castings," by A. T. Peters, R. S. Busk, and H. E. Elliott, Dow Chemical Co., Midland, Mich.

"Grain Size of Sand Cast Magnesium Alloys," by Oscar Blohm, Hills-McCanna Co., Chicago.

Tuesday, Oct. 17

9:30 A. M. and 2:00 P. M.—Euclid Room, Hotel Statler

Symposium on Creep of Nonferrous Metals and Alloys

Chairmen—M. L. Burghoff and E. E. Schumacher.

"Application of Nonferrous Alloys in Stress Design," by J. J. Kanter, Crane Co., Chicago.

"Creep Test Methods and the Interpretation of Creep Data," by P. G. McVetty, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Creep Characteristics of a Phosphorized Copper," by N. L. Burghoff and A. I. Blank, Chase Brass & Copper Co., Waterbury, Conn.

"Creep Properties of Cold Drawn Annealed 'B' Monel and Inconel," by B. B. Betty, H. L. Eiselstein and P. P. Huston Jr., International Nickel Co., New York.

"Creep Properties of Cast Bronze," by H. E. Montgomery, Lunkenheimer Co., Cincinnati.

"Creep Data on Die Cast Zinc Alloy," by E. H. Kelton and B. B. Grissinger, New Jersey Zinc Co., New York.

"Creep Properties of Some Rolled Lead Alloys," by A. A. Smith Jr., American Smelting & Refining Co., New York.

2:00 P. M.—Lattice Room, Hotel Statler

Nonferrous Production Metallurgy

"Tin Smelting and Metallurgy," by C. L. Mantell, consulting chemical engineer.

"Beryllium," by Donald M. Liddell, consulting engineer.

"Antimony: Its Metallurgy and Refining," by Chung Yu Wang, Wah Chang Trading Corp., New York; and Guy C. Riddell, consulting mining engineer.

7:00 P. M.—Euclid Room

Annual Fall Dinner, Metals Division

Wednesday, Oct. 18

General Session

2:00 P. M.—Pine Room, Hotel Statler

"Orientation Structure on the Surface of Cast Metals," by Gerald Edmunds, New Jersey Zinc Co., New York.

"The Hardness of Silver-Antimony Solid Solutions," by R. M. Treco and J. H. Frye, Lehigh University, Easton, Pa.

"Substitute Solders of the 85-15 Lead-Tin Type," by James B. Russell and J. O. Mack, Naval Research Laboratory, Anacostia, Washington, D. C.

Iron and Steel Discussion

IRON AND STEEL DIVISION

Monday, Oct. 16

2:00 P. M.—Pine Room, Hotel Statler

General Session

"Recovery of Cold Worked Aluminum-Iron as Detected by Changes in Magnetic Properties," by J. S. Stanley, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Distribution of Carbon Between Titanium and Iron in Steels," by W. P. Fishel and Bryson Robertson, Vanderbilt University, Nashville, Tenn.

"Transformation of Austenite in a 3 Per Cent Chromium 1 Per Cent Carbon Steel," by E. P. Klier, Pennsylvania State College, State College, Pa.

Tuesday, Oct. 17

10:00 A. M.—Pine Room, Hotel Statler

General Session

"Measurement and Control of Hydrogen Embrittlements in Type 440C Stainless Steel Wire," by C. A. Zapffe and M. Eleanor Haslein, Rustless Iron & Steel Corp., Baltimore.

"Effect of Time Storage on Ductility of Welded Test Specimens," by C. E. Jackson and G. G. Luther, Naval Research Laboratory, Anacostia, Washington, D. C.

2:00 P. M.

Symposium on Recent Developments Dilatometric Analysis

Chairmen—F. M. Walters Jr., and H ard Scott.

"Dilatometric Analysis of Subatmosph Transformations," by R. D. Po Massachusetts Institute of Technol Boston.

"A High-Speed Dilatometeer and Transformational Behavior of Steels," by A. L. Christiansen, E. Nelson, and C. E. Jackson, Naval search Laboratory, Anacostia, Wa ington, D. C.

"Precise Expansion Measurements Nonferrous Alloys and Glasses," W. E. Kingston, Sylvania Ele Products Inc., New York.

"An Interference Type Dilatometer Some Typical Results," by W. Fink and L. A. Willey, Alumi Co. of America, Pittsburgh.

Wednesday, Oct. 18

2:00 P. M.—Euclid Room, Hotel St

Symposium on Steelmaking

Chairmen—L. F. Reinartz and H. Work.

"Theoretical and Practical Aspects Deoxidation in Basic Open Hea Practice," by T. S. Washburn, In Steel Co., Chicago.

"Slag-Metal-Oxygen Relationships Basic Open Hearth and Electric Pr esses," by J. S. Marsh, Bethleh Steel Co., Bethlehem, Pa.

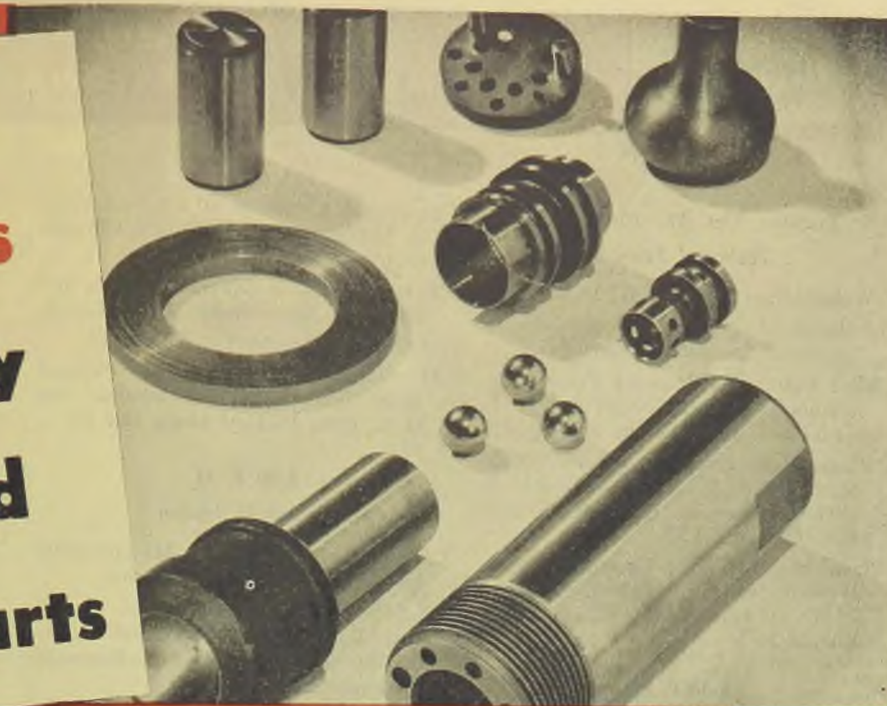
"A Rapid Laboratory Method for E mating Basicity of Open-Hearth Sla by W. O. Philbrook, A. J. Jolly and T. R. Henry, Wisconsin St Works, Chicago.

"Application of pH Slag Basicity Me urements to Basic Open-Hearth Ph phorus Control," by Michael Ten baum and C. C. Brown, Inland St Co., Chicago.

—o—

J. Edward Donellan, vice president charge of sales, General Alloys Cor Boston, has been loaned to the Americ Society for Metals so that he can sup intend the installation of this year's W Conference Display. Mr. Donellan, former member of the ASM staff, h supervised this job for the past 20 years

Stop rejections of highly finished steel parts



...protect them against corrosion

rotection during ocessing Application of a single t of NO-OX-ID—the original rust preven- e—keeps corrosive elements from injuring shed surfaces while parts are in process. ily applied by cold dip or spray, producing extremely light protective coating which s not interfere with inspection.

Protection for export shipment For permanent protection treat the part with NO-OX-ID and wrap it with NO-OX-IDized Wrapper. Seal with NO-OX-ID Sealer. Then pack in a case lined with NO-OX-IDized Wrapper to form a moisture vapor-proof shipping container for export shipment by land, sea, or air.

The ORIGINAL RUST PREVENTIVE

Dearborn Chemical Company
Dept. S, 310 S. Michigan Ave., Chicago 4, Illinois

Technical Program

SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS

Hotel Carter
CLEVELAND

Tuesday, Oct. 17—10:00 A. M.

Technical Session

Welcome by President W. M. Murray

Chairman—C. O. Dohrenwend Armour Research Foundation, Chicago.

"Shot Peening to Improve Fatigue Resistance," by O. J. Horger and H. R. Neifert, Timken Roller Bearing Co.

"Plastic-Flow Problems by Photo-Grid Methods," by J. F. Harding and C. P. O'Haven, Armour Research Foundation, Chicago.

"Load Distribution in Riveted and Spot-Welded Joints," by M. Goland and L. D. Morris, Curtiss-Wright Corp., Buffalo, N. Y.

2:30 P. M.

Technical Session

Chairman—O. J. Horger, Timken Roller Bearing Co., Canton, O.

"Residual Stress Studies of Life Improving Surface Treatments," by R. W. Greaves, E. C. Kirstowsky and C. Lipson, Chrysler Corp., Detroit.

"New Approaches to Engineering Design," by E. E. Stilson, R. H. Peterson and R. C. Pocock, Bendix Aviation Corp., South Bend, Ind.

Wednesday, Oct. 18—10:00 A. M.

Symposium on Crankshaft Stresses

Chairman—C. Lipson, Chrysler Corp.

"Structural Evolution of a Crankshaft," by S. Oldberg and C. Lipson, Chrysler Corp., Detroit.

"Determination of Operating Loads and Stresses in Crankshafts," by A. Goloff, Caterpillar Tractor Co., Peoria, Ill.

"Metallurgical Processing of Packard Built Rolls-Royce Crankshafts," by M. L. Frey, Packard Motor Car Co.

2:30 P. M.

Technical Session

Chairman—J. M. Lessells, Massachusetts Institute of Technology, Boston.

"Full Scale Fatigue Testing of Crankshafts," by C. W. Gadd and N. A. Ochiltree, General Motors Research Laboratories, Detroit.

"Determining Crankshaft Durability for Increased Performance of In-Line Engine," by W. Osborn, Sterling Engine Co., Buffalo, N. Y.

Thursday, Oct. 19, 10:00 A. M.

Technical Session

Chairman—C. W. MacGregor, Massachusetts Institute of Technology, Boston.

"The Application of Stress Models to Specific Structural Problems," by S. F. Tingley, Goodyear Aircraft Corp., Akron, O.

"Electrical Analogy for Shear Lag Problems," by R. E. Newton, Curtiss Wright Corp., Paterson, N. J.

"Electric Method for the Solution Laplace's Equation," by V. Pasch Columbia University, New York

6:30 P. M.

S.E.S.A. Dinner

Friday, Oct. 20—10:00 A. M.

Technical Session

Chairman—E. L. Shaw, Goodyear craft Corp., Akron, O.

"Precision Determination of Weigh Means of Bonded Strain Gages," A. L. Thurston, Cox & Stevens craft Corp., Mineola, L. I., N. Y., R. W. Cushman, Foxboro Co., boro, Mass.

"The Magnetic Coupled-Torque Me by B. F. Langer, Westinghouse search Laboratories, E. Pittsburgh

"Impact Stress Analysis by Brittle C ings," by G. Ellis, Magnaflux Corp

2:30 P. M.

Special Session on Electrical Strain Techniques

Chairman—G. S. Burr, Forging Rese Association.

"Electric Gaging Systems: Their S tion and Application," by H. C. erts, University of Illinois, Champa Ill. Open forum will follow.

Technical Program

AMERICAN INDUSTRIAL RADIUM AND X-RAY SOCIETY

Hollenden Hotel
CLEVELAND

Thursday, Oct. 19—10:00 A. M.

Technical Session

Chairman—Dr. Dana W. Smith, Aluminum Co. of America, Pittsburgh.

"Automatic Film Processing and Equipment," by Robert Sarderson, Pako Corp.

"Quality Control of Arc Weld by X-Ray Examination," John J. Chyle, A. O. Smith Corp.

"A Practical Comparison of Fluoroscopy with Radiography," by Robert Mayer, Kelley-Koett Mfg. Co. Inc.

"Filtration," by Don M. McCutcheon, Ford Motor Co., Detroit.

2:00 P. M.

Annual Meeting—Election of Officers

1944 *Mehl Lecture*

"Experimental Stress Analysis in Radiographically Sound Materials," by Dr. George L. Clark.

Address of Retiring President

Presentation of Mehl Lecture Award

Maynard B. Evans Jr.

Friday, Oct. 20—10:00 A. M.

Technical Session

Chairman—R. E. Lorenz, Combustion Engineering Co. Inc., New York.

"Quality Control of Radiographs by a Direct Density Check," by Alvin F. Cota, A. O. Smith, Corp.

"A Simplified Method of Film Evaluation," Emery Meschter, E. I. Du Pont de Nemours & Co. Inc.

"Method of Determining Metal Thickness Radiographically," H. P. Moyer and P. L. Kline, American Propeller Corp.

"Three Dimensional Radiography," Douglas Winnek, Winnek Laborat

2:00 P. M.

Technical Session

Chairman—R. F. Thompson, Doc Chicago Division, Chrysler Corp.

"Requirements in Specifications for U form Radiographic Technique, by George A. Russ, Claud S. Gordon

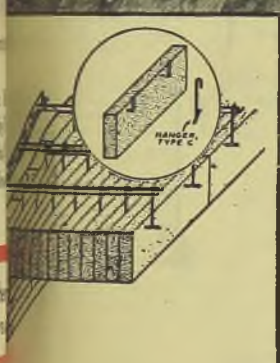
"Use of Static Tests as a Method of termining Radiographic Classificat of Castings," by F. E. Wyle, Trip & Barton Inc.

"An Example of Electron Images in lion-Volt Radiography," by Al Mo Triplett & Barton Inc.

"The Three Functions of the Radiograp Interpreter," by Dr. Leslie W. B Triplet & Barton Inc.

Reline Furnaces *twice as fast*

with big, new J-M Insulating Fireblok



Placing the new J-M Fireblok in a suspended arch-type furnace. Despite the large size of Fireblok, it is easily handled because it is light in weight. Diagram shows this arch construction in greater detail.

YOU CAN GET your furnaces back in service much quicker, thus making substantial savings in down time as well as maintenance crew time by using big, lightweight Johns-Manville Insulating Fireblok. For one Fireblok covers more surface than five regular-size fire brick and, therefore, is much easier and quicker to place.

Easy cutting and fitting—J-M Fireblok can be easily cut with a saw and shaped with a rasp. Most special shapes can be either shop or field cut from standard slabs, reducing the inventory of special shapes.

Minimum of joints—the large size, compared to the standard fire brick unit, materially reduces the number and length of joints, resulting in a thermally more efficient construction.

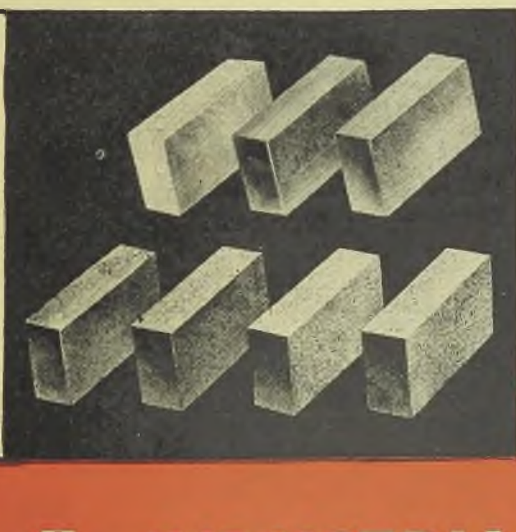
Economical bonding—with reduced joint length Fireblok requires a minimum of air-set cement for bonding. (J-M 1626 Cement was especially developed for this use.)

Uses—Fireblok can be used wherever Insulating Fire Brick are recommended such as for heat-treating furnaces, flues, stacks, mains and similar equipment. Also for the lining of doors, suspended arches, and, when tapered, for sprung arches of exceptional stability.

* * *

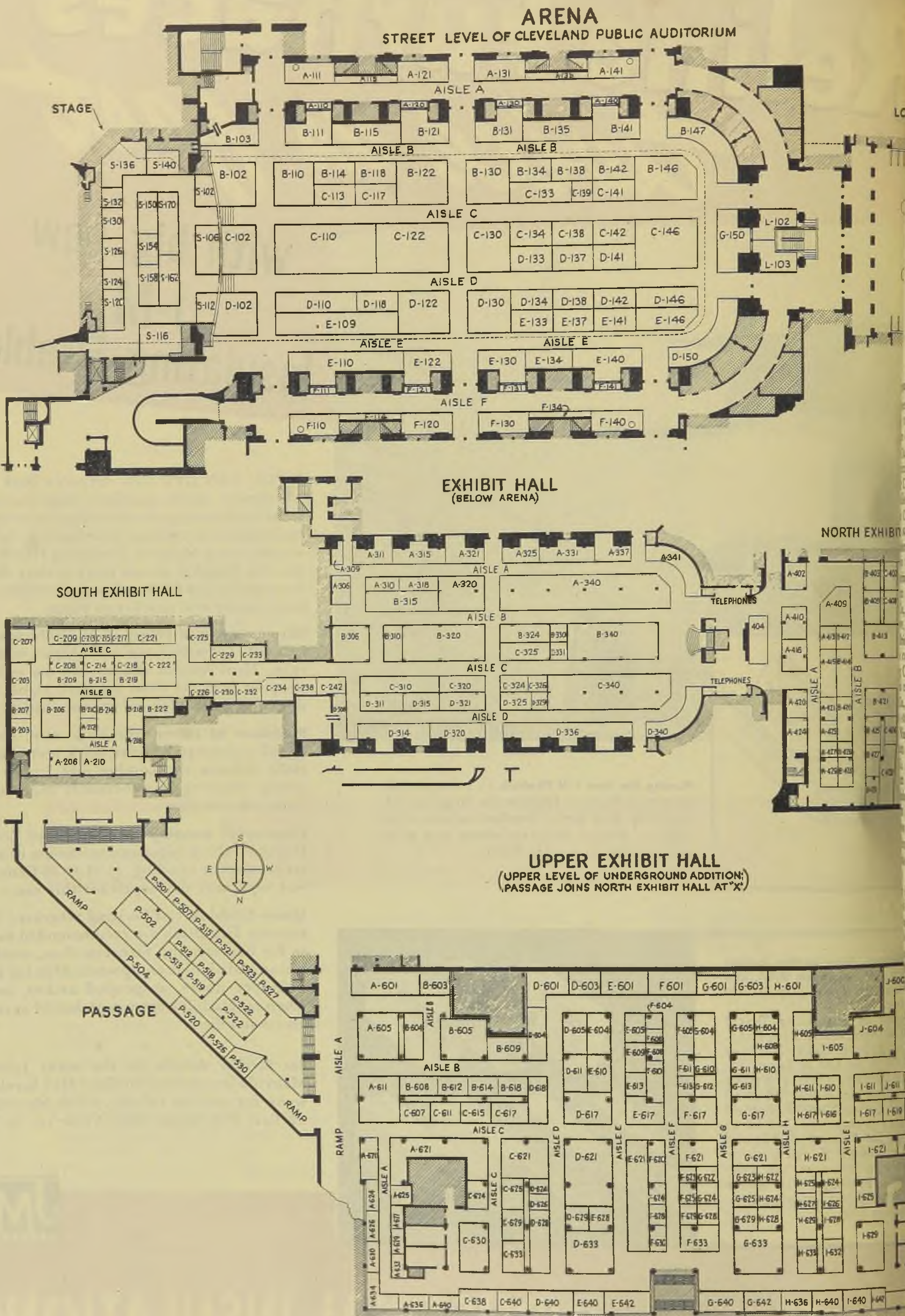
For further details on the many Johns-Manville Insulations for Steel Mill Service, write for catalog GI-6A, Johns-Manville, 22 East 40th Street, New York 16, N. Y.

**efficient, long-lasting insula-
, try J-M Insulating Brick and
lating Fire Brick.** 7 types are
ilable.
types of Insulating Brick:
O-Cel Natural Brick for temp.
1600° F; Sil-O-Cel C-22 Brick
2000° F; Sil-O-Cel Super In-
ting Brick to 2500° F. 4 types
nsulating Fire Brick: JM-1620
1600° (or to 2000° F. behind
ctory protection); JM-20 to
0° F; JM-23 to 2300° F; and
26 to 2600° F. All provide
tweight, low cost, low con-
tivity. Insulating Fire Brick
ers from J-M Insulating Fire-
k *only* in size.



JOHNS-MANVILLE JM PRODUCTS

ohns-Manville INDUSTRIAL INSULATIONS


ARENA
STREET LEVEL OF CLEVELAND PUBLIC AUDITORIUM
STAGE
EXHIBIT HALL
(BELOW ARENA)
SOUTH EXHIBIT HALL
NORTH EXHIBIT
TELEPHONES
UPPER EXHIBIT HALL
(UPPER LEVEL OF UNDERGROUND ADDITION; PASSAGE JOINS NORTH EXHIBIT HALL AT "X")
PASSAGE
RAMP

EXHIBITORS

At the War Conference Display

Cleveland Public Hall
West Sixth Street and Lakeside Avenue, Cleveland
October 16-20, 1944
(Booths may be located by referring to the floor plans on the opposite page)

A

Company	Booth
ber Engineering Works Inc., Waterford, Wis. Milling cutters	H-627
me Pattern & Tool Co.	K-615
me Tool Co., New York Mechanical specialties and tools	A-620
-Detroit Co., Ann Arbor, Mich. Dust collectors	K-615
jax Electric Co. Inc., Philadelphia Electric salt bath furnaces	C-340
jax Electrothermic Corp., Trenton, N. J. Induction melting furnaces	D-331
jax Engineering Corp., Trenton, N. J. Aluminum melting induction furnaces	C-330
llen Mfg. Co., Hartford, Conn. Set screws, cap screws; pipe plugs, dowel pins, etc.	E-137
llison Co., Bridgeport, Conn. Abrasive cutting machines	D-315
Alloy Casting Co., Champaign, Ill. Heat and corrosion resistant castings	C-113
Alloy Rods Co., York, Pa. Stainless steel arc welding electrodes	E-642
Alox Corp., Niagara Falls, N. Y. Lubricants	D-413
Aluminum Co. of America, Pittsburgh Aluminum	A-621
minum Industries Inc., Cincinnati Aluminum alloy castings	A-413
lvey-Ferguson Co., Cincinnati Metal cleaning machines; conveyor systems	F-162
merican Brake Shoe Co., Chicago Heights, Ill. Castings	B-122
merican Car & Foundry Co., New York Rivet and soldering heaters; other heaters	A-318
merican Chain & Cable Co. Inc., Bridgeport, Conn. Steel valves, fittings, castings, abrasive cutting machines	D-321
merican Cyanamid Co., New York Heat treating products	H-601
merican Foundry Equipment Co., Mishawaka, Ind. Shot peening equipment, etc.	P-504, P-508, P-516
merican Gas Furnace Co., Elizabeth, N. J. Rotary gas carburizing furnaces	B-103
merican Machine & Metals Inc., Riehle Testing Machine Division, East Moline, Ill. Testing machines	A-424
merican Machinist, New York Publications	B-111
merican Manganese Steel Div. of American Brake Shoe Co., Chicago Heights, Ill. Castings	B-122
merican Metal Market, New York Publications	G-622
merican Photocopy Equipment Co., Chicago Photocopy equipment	A-337
merican Porcelain Enameling Co., Muskegon, Mich.	C-428
merican Society for Metals, Cleveland Educational exhibit	S-116
merican Type Founders Inc., Elizabeth, N. J. Induction heating units	G-633
American Utilities Corp., Cleveland	A-633
Ampco Metal, Inc., Milwaukee Sand and centrifugal castings; alloys; safety tools; bronze weld rod	D-130
Anderson Oil Co., F. E.; Portland, Conn. Rust preventives; cutting and grinding oils; cleaners	A-420
Ansco, A Division of General Aniline & Film Corp., Binghamton, N. Y.	C-203
Armstrong Cork Co., Lancaster, Pa. Fire brick, cements	C-615
Aro Equipment Corp., Bryan, O. Portable rotary pneumatic tools	I-624
Automatic Temperature Control Co. Inc., Philadelphia Control instruments	P-513
Automatic Transportation Co., Division of Yale & Towne Mfg. Co., Chicago Materials handling equipment	A-409
Automotive & Aviation Industries, Philadelphia Publications	G-623

B

Company	Booth
Babcock & Wilcox Co., Refractories Division, New York Refractories	C-133
Bailey Meter Co., Cleveland Indicating, recording and controlling instruments	I-640
Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia Fatigue testing equipment	B-605
Baker & Co. Inc., Newark, N. J. Metal treating furnaces	A-421
Baker-Raulang Co., Cleveland Materials handling equipment	K-603
Barrett-Cravens Co., Chicago Materials handling equipment	C-633
Bastian-Blessing Co., Chicago Oxy-acetylene welding, cutting apparatus	P-512
Bausch & Lomb Optical Co., Rochester, N. Y. Scientific instruments	C-607
Bell & Gossett Co., Morton Grove, Ill. Quench systems, heat transfer equipment and pumps	D-618
Bellis Heat Treating Co., Branford, Conn.	H-604
Bellows Co., Akron, O. Controlled air power devices	D-311
Bison Forge Co. Inc., Buffalo Hammered forgings	F-606
Black Drill Co., Cleveland Drills	D-146
Bradley Washfountain Co., Milwaukee Multistall showers, fountains	C-625
Brickseal Refractory Co., Hoboken, N. J. Refractories	F-611
Bridgeport Brass Co., Bridgeport, Conn. Copper and brass products	A-315
Briggs Mfg. Co., Cleveland	D-640
Bristol Co., Waterbury, Conn. Control instruments	B-614
Brown Instrument Co., Division of Minneapolis-Honeywell Regulator Co., Philadelphia Control instruments	F-601

EXHIBITORS

Company	Booth
Brush Development Co., Cleveland Surface analyzers	E-619
Budd Induction Heating Inc., Detroit Induction heat treating equipment	D-320
Buehler Ltd., Chicago Cut-off machines	E-133
Burdett Mfg. Co., Chicago Drying ovens	D-601

C

Campbell Division, Andrew C., of American Chain & Cable Co. Inc., Bridgeport, Conn. Abrasive cutting machines	D-321
Canadian Radium & Uranium Corp., New York Radiographic equipment	G-628
Carboloy Co. Inc., Detroit Cutting tools	E-604
Carpenter Steel Co., Reading, Pa. Stainless steels	D-102
Central Scientific Co., Chicago Laboratory equipment	P-523
Chemical Rubber Co., Cleveland Laboratory equipment	A-310
Cherry Rivet Co., Los Angeles Rivets	C-242
Chicago Flexible Shaft Co., Stewart Industrial Furnace Division, Chicago Flexible shaft drives; industrial furnaces	A-410
Chicago Specialty Welding Co.	P-502
Chicago Steel Foundry Co., Chicago Castings	L-102
Cities Service Oil Companies, New York and Chicago Petroleum products	F-629
Clark Co., Robert H.; Beverly Hills, Calif. Cutting tools	K-617
Clark Instrument Inc., Dearborn, Mich. Hardness testers	C-233
Clark Tructractor Division of Clark Equipment Co., Battle Creek, Mich. Fork trucks	C-221
Cleveland Chamber of Commerce	G-640
Cleveland Duplex Machinery Co., Cleveland	B-215
Cleveland Ordnance District	K-623-43
Cleveland Pneumatic Tool Co., Cleveland Tools	A-620
Cleveland Tapping Machine Co., Cleveland Tapping machines	B-603
Climax Molybdenum Co., New York Ferroalloys	D-425
Coffing Hoist Co., Danville, Ill. Hoists	C-424
Commerce Pattern Foundry & Machine Co.	I-625
Conover-Mast Corp., New York Publications	D-629
Continental Industrial Engineers, Chicago Heat treating furnaces	D-424
Continental Machines, Inc., Minneapolis Gages, instruments, surface grinders, sawing machines, grinding machines	B-314, B-320
Crown Rheostat & Supply Co., Chicago Plating equipment	C-428
Crozier Machine Tool Co., Hawthorne, Calif. Machine tools	K-611
Crescent Machine Co.	C-409

D

Darwin & Milner, Inc., Cleveland Die and tool steels	A-429
Dearborn Chemical Co., Chicago Rust preventives; water treatments	I-632
DeBurr Barrel Co.	K-616
Delaware Tool Steel Corp., Wilmington, Del. Controlled atmosphere furnaces	A-325
Dempsey Industrial Furnace Corp., Springfield, Mass. Industrial furnaces	I
De Sanno & Son, Inc., A. P.; Phoenixville, Pa. Abrasive cut-off machines and disks	I
Despatch Oven Co., Minneapolis Furnaces	(
Detroit Stamping Co., Detroit Clamping devices; stampings	]
Detroit Surfacing Machine Co., Detroit	
Detroit Testing Machine Co.	
DeWalt Products Corp., Lancaster, Pa. Abrasive cutting machines	
Diamond Tool Co., Los Angeles Milling machines	
Die Casting, Cleveland Publications	
Dietert, Harry W.; Detroit Laboratory equipment	D-1
Dillon & Co. Inc., W. C.; Chicago Manufacturers; engineers; research development	
Diversey Corp., Chicago Metal cleaning and metalworking compounds	
Divine Brothers Co., Utica, N. Y., and Yerges Mfg. Co., Fremont, O. Lathes, polishing wheels, and buffs	
DoAll Co., Cleveland, Des Plaines, Ill. Sawing and filing machines	B-320, B-314,
Dow Chemical Co., Midland, Mich Magnesium	B-311,
Dravo Corp., Pittsburgh Identometers	
Drop Forging Association, Cleveland Forgings	
Ductile Chrome Process Co., Detroit Chromium plating process	
Du Mont Laboratories Inc., Allen B.; Passaic, N. J. Testing and sorting equipment	
Du Pont de Nemours & Co., E. I.; Wilmington, Del.	
Dyson Sons Inc., Joseph, Cleveland Forgings	

E

East Shore Machine Products Co., Cleveland	
Eastern Smelting & Refining Corp., Boston Gold, silver, mercury	
Eastman Kodak Co., Rochester, N. Y.	
Ecco High Frequency Corp., North Bergen, N. J. Induction heaters	
Eclipse Fuel Engineering Co., Rockford, Ill. Furnaces	
Elastic Stop Nut Corp. of America, Newark, N. J. Fasteners	
Electric Furnace Co., Salem, O. Brazing, heat treating, annealing furnaces	
Electric Production Magazine, Cleveland Publications	
Electro-Alloys Co., Unit of American Brake Shoe Co., Elyria, O.	
Electro Etch Co.	
Elgin Watch Co.	
Elwell-Parker Electric Co., Cleveland Lift and fork trucks	C-421,
Engineers Specialties Division, Cleveland and Buffalo Precision gage charts	
Erickson Steel Co., Cleveland Collet chucks, holders, mandrels, tapping chucks	
Eutectic Welding Alloys Co., New York Welding rods	
Executone Systems, Cleveland Communicators	

F

Fansteel Metallurgical Corp. and Vascoloy-Ramet Corp., North Chicago, Ill. Rare metals; cutting tools; wear resisting parts	

Steady Production Dependability

Vaughn

DRAW BENCHES

Day after day, month after month, year after year, Vaughn Draw Benches keep production flowing—with an ease that seems effortless. But users know that the strength, precision and durability required for smooth performance are "built-in" by Vaughn to deliver a consistently satisfactory job wherever installed.

THE VAUGHN MACHINERY COMPANY

CUYAHOGA FALLS, OHIO

COMPLETE COLD DRAWING EQUIPMENT

Continuous or Single Hole . . . For the Largest Bars and Tubes . . . For the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

These tools of

MO-MAX

HIGH SPEED STEEL

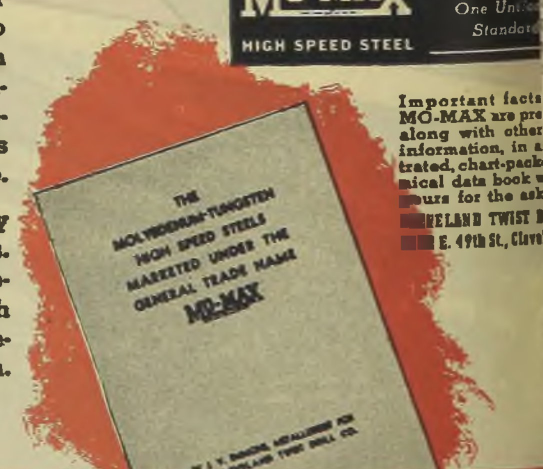
have 154,999,999 brothers

MO-MAX tool totals run into "box-car figures". For example, one tool maker alone has turned out no less than 155 million cutting tools of MO-MAX. From this you can judge the wide acceptance now enjoyed by the first commercially available molybdenum high speed steel, a steel that has proved its leadership in ten years of test and performance.

MO-MAX has superior cutting quality. It is a happy combination of great toughness and high hardness. Its basic composition is long established and obtainable from any sources. Special varieties, such as the cobalt types and hot die steel have been developed, and are available to those who need them.

MO-MAX HIGH SPEED STEEL

YEAR AFTER
One Unti
Standa



Important facts
MO-MAX are pre
along with other
information, in a
trated, chart-pack
mical data book
ours for the ask
ELAND TWIST D
E. 49th St., Clevel

THEY'RE ALL MO-MAX

"LMW"	Allegheny Ludlum Steel Corp.	"Molite 8"	Columbia Tool Steel Company	"Tatmo"	Latrobe Electric Steel Co.
"Mohican"	Atlas Steels, Ltd.	"Rex-T-Mo"	Crucible Steel Co. of America	"S. T. M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal-Cyclops Steel Corp.
"Mo-Cut"	Braeburn Alloy Steel Corp.	"Rex-T-Mo"	Halcomb Steel Co.	"8-N-2"	Vanadium-Alloys Steel Co.
"Star Max"	The Carpenter Steel Co.	"Mogul"	Jessop Steel Company	"Vul-Mo"	Vulcan Crucible Steel Co.

EXHIBITORS

Company	Booth
ederal Products Corp., Providence, R. I.	P-520
Precision measuring instruments	
deral Telephone & Radio Corp., Newark, N. J.	P-525
Induction heating equipment	
rotherm Co., Cleveland	C-230
ell System Inc., Elkhart, Ind.	A-427
Floor maintenance equipment	
rth Sterling Steel Co., McKeesport, Pa.	B-146
High speed and tool steels; stainless steels	
quil Products, Inc., New York	F-608
City Foundries Co., Cleveland	A-626
Castings	
toria Industrial Service	F-120
UNDRY, THE; Cleveland	E-146
Publications	
Grinders, Inc., Pittsburgh	A-218
Grinders	
xboro Co., Foxboro, Mass.	B-114
Control instruments	
ontier Bronze Corp., Niagara Falls, N. Y.	B-428
Castings	
ton Foundry & Machine Co., Cleveland	D-621, D-625, E-624
Meehanite castings	
rt Co., E. A.; Chicago	C-225
mons Steel Co., Youngstown, O.	G-642
wick Airflex Co.	C-207

G

Company	Booth
amma Instrument Co. Inc., New York	D-624
Laboratory equipment	
as Appliance Service Inc., Chicago	C-225
eneral Alloys Co., Boston	C-146
Heat and corrosion-resisting alloys	
General Aniline & Film Corp., Binghamton, N. Y.	C-203, B-209
General Electric Co., Schenectady, N. Y.	G-604
Induction heating equipment, electric furnaces	
General Electric X-Ray Corp., Chicago	C-122
uoroscopic, X-ray equipment	
Globe Machine & Stamping Co., Cleveland	C-409
Stampings	
Gordon Co., Claud S.; Chicago	C-617
Laboratory and testing equipment	
Rotary File & Tool Co.	B-412
Mills Co., Evanston, Ill.	A-416
trifugal pumps	
Oil Corp., Pittsburgh	A-331
Lubricants	

H

Company	Booth
H Research Co., Detroit	A-620
Tools and accessories	
ilton Kent Mfg. Co., Kent, O.	F-624
Mountings	
ammond Machinery Builders Inc., Kalamazoo, Mich.	E-109, E-113, E-117
Grinding, polishing and buffing machines	
andy & Harman, New York	E-140
Silver and silver alloys	
per Co., H. M.; Chicago	I-628
Brass and bronze products	
uck Mfg. Co., Brooklyn, N. Y.	H-617
Oil and gas burners	
l Engineering Co., Cleveland	P-521
Chemical resisting equipment	
rcules Electric & Mfg. Co. Inc., Brooklyn, N. Y.	H-605
Welding machines; electric controls	
Duty Electric Co., Milwaukee	D-142
Electric heat treating furnaces	
Floor Machine Co., Chicago	B-142
Floor scrubbing machines	
lcroft & Co., Detroit	C-217
lden Co., A. F.; New Haven, Conn.	B-147
Heat treating equipment	

Company	Booth
Holliday & Co., W. J.; Hammond, Ind.	G-632
Cold finished steels and shafting	
Houghton & Co., E. F.; Philadelphia	C-130
Heat-treating salts; lubricants, cutting oils; rust preventives	
Howe & Son Inc., Hinsdale, N. H.	C-232
Saw sharpeners; tool grinders	

I

Company	Booth
Ideal Commutator Dresser Co., Sycamore, Ill.	B-207
Illinois Testing Laboratories, Inc., Chicago	D-138
Laboratory equipment	
Illinois Tool Works, Chicago	C-310
Independent Pneumatic Tool Co., Chicago	C-611
Portable electric drills, screw drivers, nut setters, grinders, sanders, polishers, etc.	
Indium Corp. of America, New York	B-612
Indium	
Induction Heating Corp., New York	D-340
Induction heating equipment	
Industrial Bulletin, Chicago	K-601
Publications	
Industrial Heating, Pittsburgh	S-130
Publications	
Industrial Oven Engineering Co., Cleveland	A-208
Industrial Tape Corp., New Brunswick, N. J.	C-218
Industry & Welding, Cleveland	F-628
Publications	
Instrument Specialties Co. Inc., Little Falls, N. J.	C-325
Beryllium copper coil and flat springs	
Internal Surface Projector Co., Mineola, N. Y.	H-636
International Nickel Co., New York	S-136
Iron Age, New York	A-415
Publications	

J

Company	Booth
Johns-Manville, New York	K-610
Insulations, refractories, packings	
Johnson & Son Inc., S. C.; Racine, Wis.	C-612
Industrial wax	
Jones Co., C. Walker; Philadelphia	A-624

K

Company	Booth
Kelley Co., J. W.; Cleveland	P-515
Industrial oils; heat treating products	
Kelley-Koett Mfg. Co., Covington, Ky.	D-314
X-ray machines	
Kennametal, Inc., Latrobe, Pa.	B-130
Hard carbide tools	
Kent Co. Inc., Rome, N. Y.	F-625
Electric scrubbing, mopping and dry vacuum equipment	
King, Andrews; Narberth, Pa.	B-138
Brinell hardness testers	
Knu-Vise, Inc., Detroit	S-102
Koch Sons Inc., George	S-128
Kold-Hold Mfg. Co., Lansing, Mich.	D-118
Steel treating equipment	
Kolene Corp., Detroit	H-629
Metal cleaning equipment	
Krouse Testing Machine Co., Columbus, O.	B-427
Fatigue testing machines	
Kux Machine Co., Chicago	A-311
Powdered metal presses; die casting machines	

L

Company	Booth
Lakeside Steel Improvement Co., Cleveland	E-122
Heat treated materials	
Lead Industries Association, New York	P-507
Lead and lead alloys	
Leeds & Northrup Co., Philadelphia	C-222
Control instruments	

EXHIBITORS

Company	Booth
Lepel High Frequency Laboratories Inc., New York and Chicago Induction heating equipment	H-610
Lester-Phoenix Inc., Division of Lester Engineering Co., Cleveland Injection molding machines	A-341
Lewis Machine Co., Cleveland Machine tools	A-210
Lewis-Shepard Products Inc., Watertown, Mass.	B-421
Light Metal Age, Chicago Publications	I-642
Lindberg Engineering Co., Chicago Heat treating equipment	C-150
Lipe-Rollway Corp., Syracuse, N. Y.	B-219
Lithium Co., The, Newark, N. J. Heat treating furnaces	K-620
Loma Machine Mfg. Co., New York	H-216
Los Angeles Chamber of Commerce, Los Angeles Maps	A-630
Lukens Steel Co. and Divisions; By-Products Steel Corp., Lukenweld Inc., Coatesville, Pa. Steel and weldments	B-110

M

Company	Booth
Maas and Waldstein Co., Newark, N. J. Industrial finishes	C-209
MACHINE DESIGN, Cleveland Publications	E-146
Machine Tool Blue Book, Chicago Publications	B-629
Machinery, New York Publications	E-141
Machinery Mfg. Co., Los Angeles Carbide milling cutters	C-234
Magnaflux Corp., Chicago Inspection equipment	E-621
Magnetic Analysis Corp., Long Island City, N. Y. Inspection equipment	C-415
Mahr Mfg. Co., Minneapolis Metal treating furnaces	B-134
Mallory & Co. Inc., P. R.; Indianapolis	E-601
Martin Co., Glenn L.; Baltimore	C 216
Martindale Electric Co., Cleveland Flexible shaft tools	D-325
McDill, Rex D.; South Euclid, O. Engineer	F-623
Meehanite Research Institute, New Rochelle, N. Y. Meehanite castings	D-621, D-625, E-624
Mercury Products Co., Cleveland Drill sharpeners, countersinking machines, centering machines	A-425
Metals & Alloys, New York Publications	D-431
Metal Finishing, New York Publications	C-139
Metal Finishing Service, Chicago	C-214
Metal Industries Catalog Publications	D-431
Metal Progress, Cleveland Publications	S-116
Metal Treating Institute, Philadelphia	C-141
Metallizing Co. of America, Chicago Metallizing equipment	I-619
Metallizing Engineering Co. Inc., Long Island City, N. Y. Metallizing equipment	H-624
Metallurgical Laboratories Inc., Philadelphia Commercial heat treating	C-141
Michiana Products Corp., Michigan City, Ind. Heat and corrosion resistant alloy castings	B-131
Michigan Steel Casting Co.; Alloy Casting Division; Fabricated Products Division; Precision Casting Division; Detroit Heat and corrosion resistant alloy castings; welded equipment; carbon and stainless steel castings	H-628, C-226, P-519
Mid-Continent Metal Products Co., Chicago	E-609
Microfilm Corp., Cleveland Photographic recording equipment	F-
Midland Paint & Varnish Co., Cleveland Welding fluid	B-
Mill & Factory, Chicago Publications	D-
Mine Safety Appliances Co., Pittsburgh Personal and plant protective equipment	C-
Minnesota Mining & Mfg. Co., St. Paul Grinding wheels and abrasive belts	A-
Molybdenum Corp. of America, Pittsburgh Ferroalloys and chemicals	D-
Monarch Steel Co., Indianapolis Cold finished, carbon, alloys steels; drill rod	G-
Morrow Mfg. Co., Wellston, O.	S-
Morrison Engineering Corp., Cleveland Convection heated forge furnaces	
Motch & Merryweather Machinery Co., Cleveland Machine tools	C-
Motor Products Corp., Deepfreeze Division, North Chicago, Ill. Shrink fitting equipment	A-

N

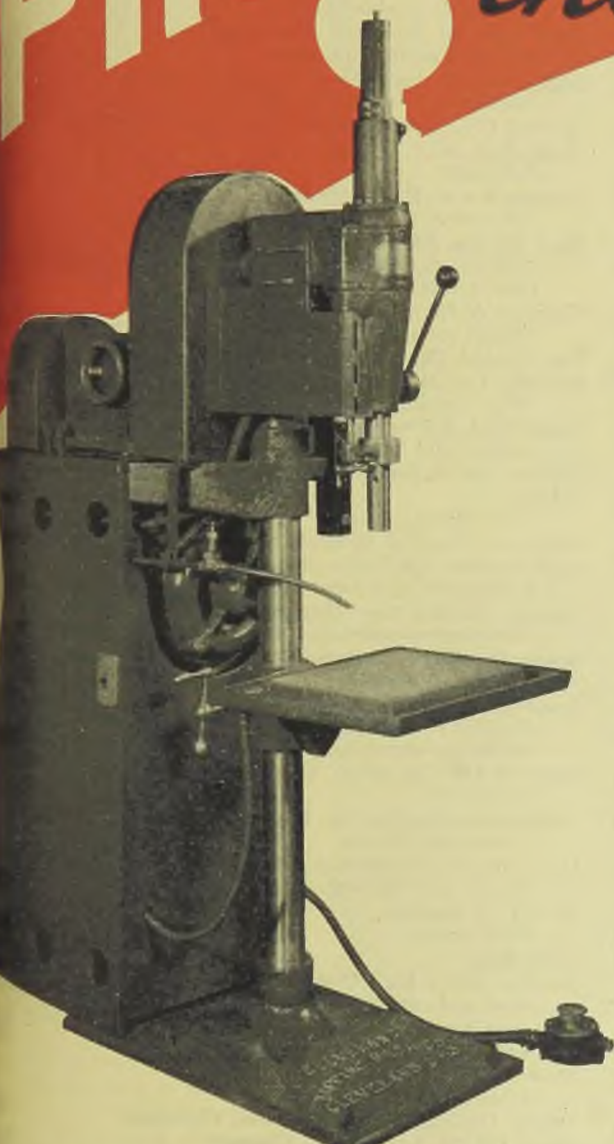
Company	Booth
National Bronze & Aluminum Foundry Co., Cleveland	P-
National Engineering Co., Chicago Mixers	D-
National Industrial Publishing Co., Pittsburgh Publications	S-
National Machine Gas Burner Division of Mid-Continent Metal Products Co., Chicago Burners and proportional mixers	E-
Nelson Specialty Welding Equipment Corp., San Leandro, Calif. Stud welding equipment	P-
NEW EQUIPMENT DIGEST, Cleveland Publications	E-
Niagara Blower Co., New York Blowers	P-
Nichols-Morris Corp., New York Machine tools	B-
Nitralloy Corp., New York	B-2
North American Mfg. Co., Cleveland Combustion equipment	C-3
North American Philips Co. Inc., New York Electric wires and products	J-6
Nox-Rust Corp., Chicago Rust preventives; oils, compounds	H-

O

Company	Booth
Oakite Products Inc., New York Cleaning materials	E-1
Ohio Aircraft Fixture Co., Cleveland	P-5
Cleveland	A-6
Ohio Carbon Co., Cleveland Carbon brushes, contacts, plates, resistors and suppressors	G-6
Ohio Crankshaft Co., Cleveland Induction heating equipment	A-3
Ohio Overall Cleaning Co. and Sani-Clean Service Inc., Cleveland Wiping towels and industrial garments	A-6
Ohio Steel Foundry Co., Springfield and Lima, O. Heat resisting alloy castings	D-1
Olson Filtration Engineers, Chicago	D-6
Omega Research Laboratory Inc., Detroit Metallurgical service	G-6
O'Neil-Irwin Mfg. Co., Minneapolis Precision bending machines	C-6
Osborn Mfg. Co., Cleveland Industrial brushes	B-6
Owens-Corning-Fiberglass Corp., Toledo, O.	B-2
Ozalid Products Division, General Aniline & Film Corp., Binghamton, N. Y.	B-2

It's the PRODUCTION... *that counts*

WITH LEAD SCREW CONTROL



This matter of PRODUCTION, so vital to our war effort, will continue to point the way to our success in peacetime manufacture. The CLEVELAND TAPPING MACHINE is the answer to the problem of getting and maintaining increased production. LEAD SCREW CONTROL TAPPING, developed by us will definitely increase your production by consistently tapping to class 3 fit on a production basis . . . by cutting rejections to an absolute minimum . . . by holding the definite depth of thread in each piece tapped to .005 limits . . . by constantly producing more and better tapped products accurately and to specifications.

Why not investigate fully the amazing efficiency of LEAD SCREW CONTROL TAPPING? Our machines will be in operation at the METAL SHOW and our engineers will be happy to give you full technical information on their simplicity of operation. We are sure that CLEVELAND TAPPING and THREADING MACHINES will be the answer to your production problems.

FREE TAPPING DATA

This "Guide for Production Tapping" is at your disposal and contains full and useful information regarding this machine operation. Write for your copy NOW!

We'll see you at the NATIONAL METAL CONGRESS, Booth B-603, CLEVELAND, OHIO—OCT. 16th to 20th

Cleveland TAPPING MACHINE COMPANY

1723 SUPERIOR AVENUE • CLEVELAND 14, OHIO

EXHIBITORS

Company — **Booth**

P

Pangborn Corp., Hagerstown, Md. A-611
Park Chemical Co., Detroit D-141
Heat treating materials
Parker Appliance Co., Cleveland B-604
Tube fittings, control valves, cylinders and other hydraulic units
Peerless Tool & Engineering Co. Inc., Chicago B-409
Jigs, fixtures, gages and dies
Penton Publishing Co., Cleveland E-146
Publications—STEEL, THE FOUNDRY, MACHINE DESIGN, NEW EQUIPMENT DIGEST, REVISTA INDUSTRIAL
Phillips Mfg. Co., Chicago P-530
Vapor degreasers; melting tanks; metal washers; industrial soaps, powders, alkalis, chemicals; chlorinated solvents
Physicists Research Co., Ann Arbor, Mich. B-121
Profilometers
Picker X-Ray Corp., New York G-617
X-ray apparatus
Prestole Division, Detroit Harvester Co., Detroit A-204
Pines Engineering Co. Inc., Aurora, Ill. F-620
Automatic hydraulic bending, threading and tube machines
Porter-Cable Machine Co., Syracuse, N. Y. L-103
Wet belt surfacers; electric hand saws; sanders and dry grinders
Precise Products Co., Racine, Wis. A-309
Portable tools
Precision Scientific Co., Chicago I-605
Metallurgical specimen cutters; mounting presses; polishers
Product Engineering, New York B-111
Publications
Progressive Welder Co., Detroit B-413
Promat Division, Poor & Co., Waukegan, Ill. C-428
Vitreous finish; plating equipment
Pyrometer Instrument Co., New York C-331
Optical pyrometers

R

Radium Chemical Co. Inc., New York E-640
Radium containers
Ransburg Co., Harper J.; Indianapolis E-110
Electrostatic spraying, detearing equipment
Ransohoff Inc., N.; Cincinnati A-601
Cleaning machines
Ransome Machinery Co., Dunellen, N. J. B-102
Revolving welding tables or positioners
Redmer Air Devices Corp., Chicago C-630
Drill presses and milling machines
Reeves Pulley Co., Cleveland P-527
Reinhold Publishing Co., New York D-431
Republic Drill & Tool Co., Chicago H-611
Tools
Resale, Chicago G-629
Publications
Resistance Welders Manufacturers Association D-336
Resistance welders
Revere Copper & Brass Inc., New York B-306
Copper and copper alloys
REVISTA INDUSTRIAL, Cleveland E-146
Publications
Reynolds Metals Co., Louisville, Ky. D-617
Aluminum and aluminum alloys
Rheem Research Products Inc. and Rheem Mfg. Co., Baltimore A-320
Chemical treatment for zinc and cadmium plated surfaces
Richards Co., J. A.; Kalamazoo, Mich. B-330
Drill press vises; multiform and bender-cutters
Riehle Testing Machine Division of American Machine & Metals Inc., East Moline, Ill. A-424
Testing machines

Company — **Booth**

Rustless Iron & Steel Corp., Baltimore C-102
Stainless steels
Ryerson & Son Inc., Joseph T.; Chicago B-141
Iron, steel and machinery

S

Salkover Metal Processing Co. Inc., Chicago and Long Island City, N. Y. G-61
Brazed parts
Scherr Co. Inc., George; New York E-13
Laboratory and testing equipment
Schraders Son, A.; Division of Scovill Mfg. Co., Brooklyn, N. Y. H-63
Pneumatic machine controls
Selas Corp. of American, Philadelphia D-12
Process heating equipment
Sentry Co., Foxboro, Mass. C-32
Hardening furnaces
Seybold Div., Harris Seybold, Potter Co., Dayton, O. K-61
Shakeproof Inc., Chicago C-31
Fasteners
Sheldon & Co., E. H.; Muskegon, Mich. J-61
Laboratory furniture
Shell Oil Co. Inc., New York J-60
Cutting, drawing, rust preventive, quenching, hydraulic oils; drawing compounds
Sherman & Co., New York F-6
Brazed parts
Size Control Co., Chicago C-21
Sly Mfg. Co., W. W.; Cleveland A-3
Blast cleaning and dust collecting equipment
Smith Tool & Engineering Co., Bucyrus, O. I-6
Surface and lapping plates
Society for Experimental Stress Analysis, Cambridge, Mass. C-2
Publications
Solventol Chemical Products, Detroit E-6
Sparkler Mfg. Co., Mundelein, Ill. I-6
Laboratory equipment
Spencer Turbine Co., Hartford, Conn. B-1
Turbo compressors, gas boosters; vacuum cleaners
Sperry Products Inc., Hoboken, N. J. B-41
Testing equipment
Standard Alloy Co., Cleveland D-41
Furnace conveyor belts; rolls; melting pots; carburizing boxes; annealing trays
Standard Oil Co. (Ohio), Cleveland B-60
Lubricants
Standard Steel Spring Co., Coraopolis, Pa. S-17
Corronizing plating
State Mfg. & Construction Co., Franklin, O. G-62
Boring and reaming tools
STEEL, Cleveland D-41
Publications
Steel Tools S-1
Sterling Alloys Inc., Woburn, Mass. B-11
Heat and corrosion resistant castings
Stevens Grease & Oil Co., Cleveland I-61
Lubricants
Stow Mfg. Co., Binghamton, N. Y. I-6
Flexible shaft equipment
Strong, Carlisle & Hammond Co., Cleveland C-2
Stuart Oil Co. Ltd., D. A.; Chicago B-3
Cutting, grinding fluids; drawing compounds; heat treating oils and lubricants
Sturgis Products Co., Sturgis, Mich. H-62
Finishing supplies
Sunnen Products Co., St. Louis C-4
Surface Combustion, Toledo, O. B-6
Heat treating furnaces
Sutton Engineering Co., Pittsburgh and Bellefonte, Pa. A-64
Straightening equipment
Swan-Finch Oil Corp., New York I-62
Swedish Crucible Steel Co., Detroit K-62

See THE LEPEL UNIT IN OPERATION

Booth H-610

National Metal Congress and War Conference Display

Public Hall, Cleveland

October 16-20

See for yourself how Lepel Induction speeds hardening and metal joining, producing superior results.

Better HEAT TREATED PARTS—FASTER—AT LOWER COST

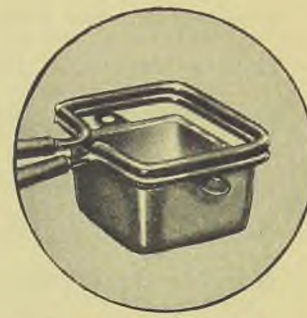
Lepel Induction Heating Units reduce heating time for hardening from minutes to seconds and effect large savings through increased production, elimination of rejects and the use of unskilled labor.

At the same time, fully automatic control of temperature cycles develops quality and uniformity seldom attained by other methods.

Lepel Induction Heating permits efficient localized hardening without costly, none-too-efficient plating, coating and baths. It frequently makes possible the use of carbon steels to replace higher-priced alloy steels without sacrifice of physical properties—often with large savings in machining.

Because of the freedom from scale and distortion, finishing costs are minimized and, in many instances, it is possible to perform forming and finishing operations before hardening, effecting important production economies.

IF YOU CANNOT ATTEND THE METAL SHOW—send for latest catalog describing the operation and advantages of Lepel Induction Heating. Or, better still, send samples of your parts with specifications of the work to be performed. Lepel engineers will process the samples according to your specifications and return them with recommendations and cost estimates.



Joining METALS FASTER, BETTER AND MORE ECONOMICALLY

Lepel Induction Heating Units quickly and neatly perform the most intricate soldering and brazing operations on ferrous and non-ferrous metals, using soldering and brazing alloys from the lowest to the highest melting points. By pre-fluxing and pre-placing the alloy in the form of rings, strips or irregular shapes, the most intricate jobs are so simplified that they can be performed in a few seconds by any unskilled worker.

As the heat is generated within the metal itself, the alloy penetrates throughout the joint or seam, assuring superior results. Since excessive heating of the surface is impossible, discoloration and scaling are practically eliminated. Little, if any, cleaning up or finishing is necessary.

Since the alloy is preformed to suit the requirements of the work, there is no waste and "runs" or "lapses" are not encountered.

LEPEL HIGH FREQUENCY LABORATORIES, INC.

Lepel *High Frequency* INDUCTION HEATING UNITS

PIONEERS IN INDUCTION HEATING
39 W. 60th, ST., NEW YORK 23, N. Y.

EXHIBITORS

Company	Booth
T	
Tagliabue Mfg. Co., C. J.; Brooklyn, N. Y.	C-408
Tal's Prestal Bender Inc., Milwaukee Pipe bending machines	B-403
TelAutograph Corp., New York Telescribers	C-238
Tempil Corp., New York Tempil products	C-117
Tennant Co., G. H.; Minneapolis Cleaning machines	S-112
Texas Co., The; New York Lubricants and cutting fluids	B-425
Tinnerman Products Inc., Cleveland Fasteners	I-617
Thompson Electric Co., Cleveland	S-120
Torit Mfg. Co., St. Paul, Minn. Air, gas torches	A-620
Towmotor Corp., Cleveland Power trucks	F-605
Trent Co., Harold E.; Philadelphia Furnaces	I-611
Trent Tube Mfg. Co., East Troy, Wis. Tubing	B-203
Tri-Clover Steel Co., Kenosha, Wis.	B-203
Triplex Machine Tool Co., New York	D-604
Troy Stainless Steel Products Co., East Troy, Wis.	B-203
Tuff-Hard Co., Detroit	S-132
Tyler Co., W. S.; Cleveland Heat and acid resisting baskets and fixtures	C-413, D-412
U	
Udylite Corp., Detroit Automatic electroplating machines	D-628, D-632
Ultra Lap Machine Co., Detroit Lapping machines	D-604
Union Steel Products Co., Albion, Mich.	P-526
United Chromium Inc., New York, Detroit, Waterbury Conn. Metal finishing processes	H-636
United States Hoffman Machinery Corp., New York Coolant filters; vacuum stills	A-636
United States Stoneware Co., Akron, O. Metal plating and finishing tanks; adhesives	H-640

Company	Booth
Universal-Cyclops Steel Corp., Bridgeville and Titusville, Pa. High-speed, alloy and carbon tool steels; stainless steels	G-6
Upton Electric Furnace Division, Commerce Pattern Foundry & Machine Co., Detroit Salt bath furnaces	I-6
V	
Van Der Horst Corp. of America, Cleveland Metal finishing process	C-
Vascalloy-Ramet Corp., North Chicago, Ill.	P-
W	
Washington, State of; Seattle	D-
Wayne Foundry Co., Detroit	H-
Welding Engineer, Chicago Publications	D-
Wellman Co., S. K.; Cleveland Metal powder products	D-
Wells Mfg. Corp., Three Rivers, Mich. Metal cutting band saws	D-
Western Metals, Los Angeles Publications	A-
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Industrial X-ray; high-frequency heating units; brazing alloys	B-
Whalley Co., George; Cleveland Metal shop equipment	C-
Wheelco Instruments Co., Chicago Control instruments	C-
Wiegand Co., Edwin L.; Pittsburgh	E-
Williams & Co. Inc., Cleveland	B-
Willson Products Inc., Reading, Pa. Safety equipment	G-
Wilson Mechanical Instrument Co. Inc., New York Hardness testing machines	C-
Wood Products Corp., J. R.; New York	B-
Wolfe-Kote Co.	J-
Wright-Hibbard Industrial Electric Truck Co. Inc., Phelps, N. Y.	B-2
Z	
Zagar Tool Inc., Cleveland Chucks, holding fixtures	E-6

A Message

To the Members of the American Society for Metals and Co-operating Societies in the National Metal Congress and War Conference Display

• THE FUTURE of the metal industry is now more than ever before a matter of vital concern to industrialists and technologists alike. Problems of reconversion with all their attendant minutiae of technical detail loom large this fall. How best to utilize and adapt the tremendous technological advances resulting from the stress of war is another matter much in the minds of technical and research men. Secretary Eisenman's selection of the theme "Design for Tomorrow" is therefore particularly appropriate as the basis of the National Metal Congress and War Conference Display, to be held in Cleveland Oct. 16 through 20, 1944.

At that time members of five great national societies will gather for technical programs and lectures, round table and panel discussions, and the largest exhibit of operating equipment, processes, products, and new materials ever to be assembled in one place. It will provide a collecting point for all the vast and widespread developments of the defense and war periods, to be evaluated in the light of future civilian production.

The American Society for Metals, sponsor of the National Metal Congress in co-operation with the Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers, the American Welding Society, the Society for Experimental Stress Analysis, and the American Industrial Radium and X-Ray Society, extends a cordial invitation to technical and research men, to executives and production men, to all who are interested in the future of the metal industry, to attend the 26th National Metal Congress and War Conference Display.

—M. A. GROSSMAN

President, American Society for Metals

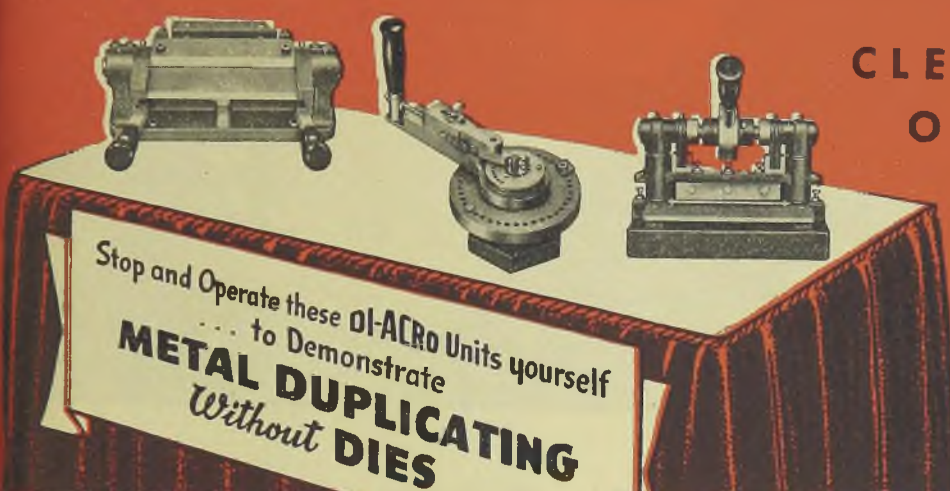
"DIE-LESS" DUPLICATING

A Modern Industrial Technique of Great Flexibility and Versatility, Utilizing

DI-ACRO PRECISION MACHINES

See them in Operation at the

NATIONAL METAL CONGRESS

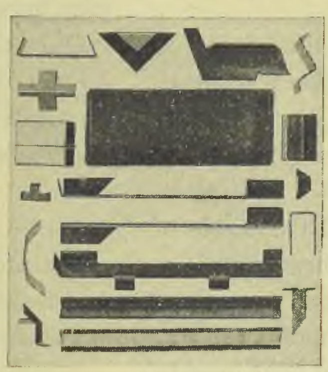


CLEVELAND
OCT. 16-20

SPACE
No. C-640

★

DI-ACRO SHEARS (right hand unit above) begin the process of "DIE-LESS DUPLICATING" by quickly and accurately shearing light and medium weight metals, plastics, rubber, fabric, synthetics, dielectrics, and various other materials, to die-like shapes.



DI-ACRO BRAKES (Left hand unit above) form angles, channels, flanges, "Vees," make box parts with speed and precision, and are readily adaptable for experimental and production runs on many intricate and special shapes.

DI-ACRO BENDERS (center unit above) duplicate parts with simple, compound or reverse bends in many materials—angle, channel, tubing, rod, wire, strip stock, etc. They also produce work not obtainable with dies.

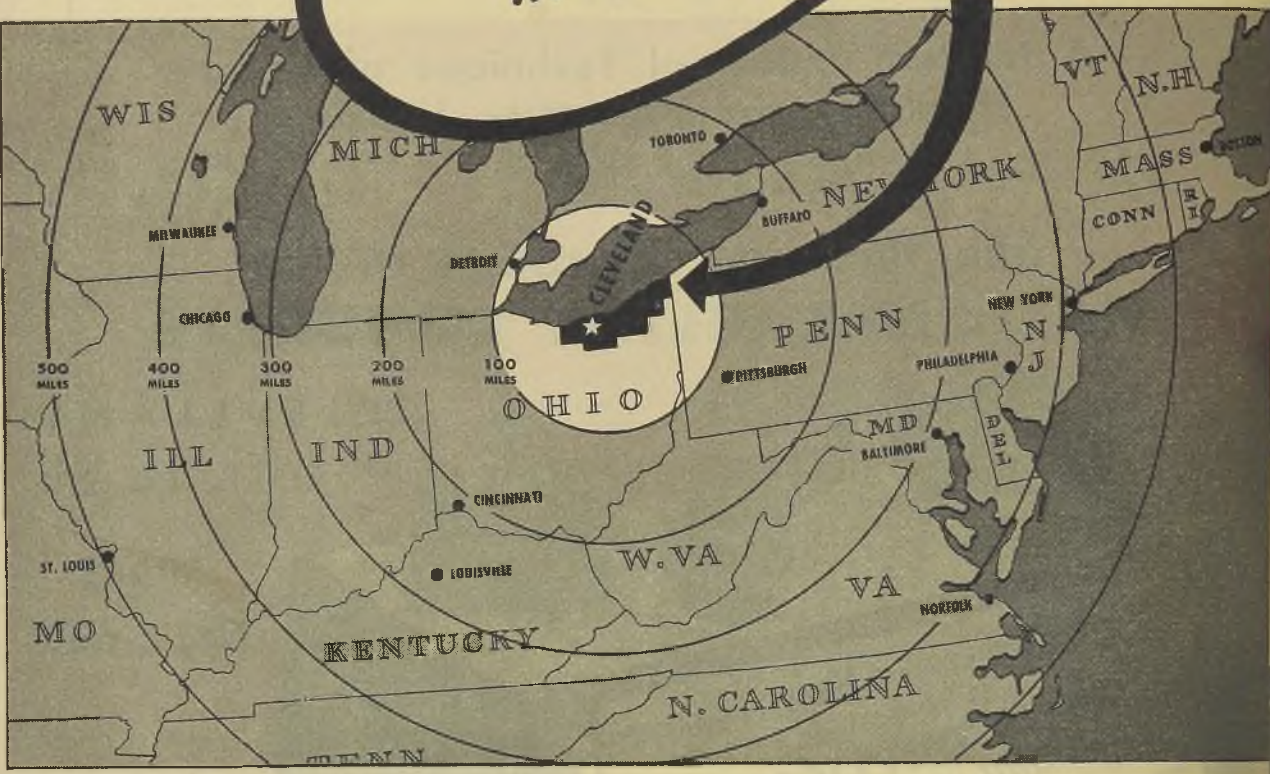
Send for Catalog "DIE-LESS DUPLICATING"

Write for your copy of the complete DI-ACRO Catalog to post yourself on the new engineering technique of "DIE-LESS DUPLICATING."

DI-ACRO PRECISION MACHINES "DIE-LESS DUPLICATING"

O'NEIL-IRWIN MFG. CO. 304 EIGHTH AVENUE SO. MINNEAPOLIS 15, MINN.

So You're Coming to *THE BEST LOCATION IN THE NATION* for Metal Industries!



So you're coming to Cleveland for the National Metal Congress!

Well, while you're here, take time to look over the *best location in the nation* for metal industries!

If your future plans include expansion of present facilities—or erection of a new plant—let our Industrial Development Division show you why Northeast Ohio is the best place for metal industries to *locate & prosper.*

We will make plant location studies for you without cost or obligation . . . and your inquiry will be treated in confidence.

We shall welcome your questions, and be glad to study your particular problems, show you the area, and put you in contact with key men here who can help you still further.

Our service includes complete, authoritative information which will give you *all* the answers on availability of plants and plant sites, specific materials and services, transportation, labor, housing, and other factors.

While you're in Cleveland, come in and get acquainted—and let us tell you more about the *best location in the nation!* Or, 'phone, wire or write *any time!*

Industrial Development Division

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

75 Public Square • Phone CHerry 4200 • Cleveland 1, Ohio

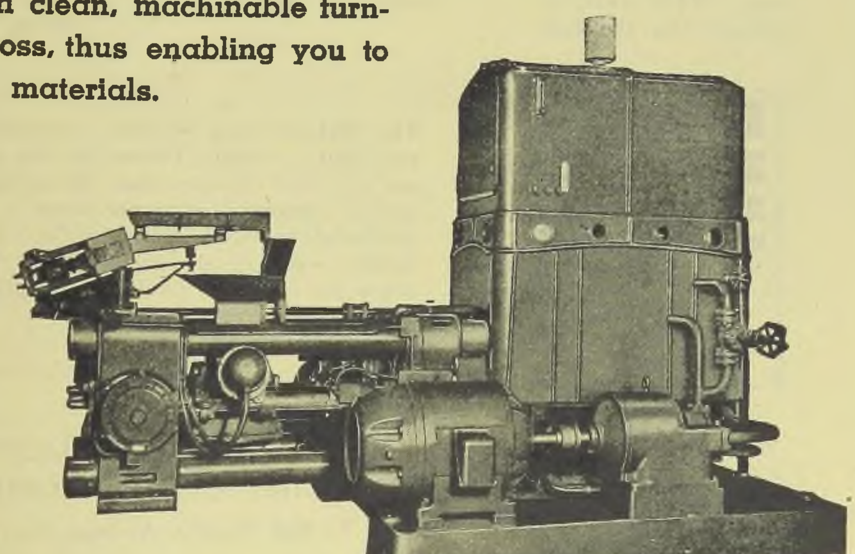
The Illuminating Company

ALWAYS ADEQUATE POWER AT LOW RATES!

Briquette to Conserve Resources!

egardless of whether your scrap is composed of *brass, ronze, aluminum, magnesium, cast iron or steel* — or any lloy of these metals — you'll find it pays to employ a lwaukee Hydraulic Press for briquetting the borings and nings. Briquettes of ANY metal listed above make ideal rap for remelting. They contain clean, machinable turn-gs which melt at a minimum loss, thus enabling you to laim the highest percentage of materials.

Illustration shows large Milwaukee Hydraulic Briquetting Press with 3½ ton-per-hour capacity. Four other sizes available.



an Post-War Needs TODAY!

servation of materials will be even e important after the war due to the vy losses resulting from this conflict. investigate briquetting possibilities y. . . . Write for further particulars.

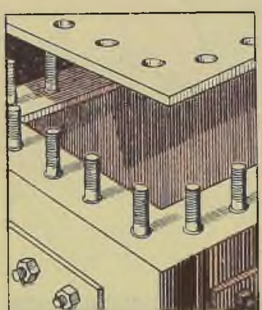
LWAUKEE FOUNDRY EQUIPMENT CO.

SEE THIS "GUN" AT THE NATIONAL METAL CONGRESS CLEVELAND, O OCTOBER 16-

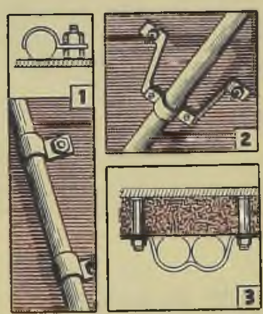
NELSON *Electric Arc* STUD WELDERS

—end-weld studs in less than one-half secon

SOME WAYS 460 INDUSTRIAL PLANTS AND SHIPYARDS ARE USING IT!



Inspection covers of all types can be secured with Nelson Studs. No drilling holes through casings, or hand welding studs. Studs are automatically welded in less than ½ second. No leaking, no loosening! The weld is stronger than the stud.



Wiring, conduit, and pipe are quickly secured. Here illustrated are a few of many methods: 1. Securing conduit. 2. Securing pipe (single or multiple runs). 3. Securing wiring of all kinds over soft insulation materials.

Electrical equipment of all kinds, outlet boxes, circuit breakers, etc., can be secured without drilling metal beams or welding small pads. Accurate locating is easy because all Nelson Studs are pointed. The economical way to secure small parts.

Metal Lath Stud welded and the in tion impaled or sp on over them. Sl washers secure th sulation. The meta is laid and secure bending over the head. It lies flat is easily covered the plaster.

Studding boiler tubes increases their efficiency. Studs act as reinforcement for the ceramic material which is put on to conduct heat to the tubes. The stud also conducts heat into tube. Nelson Studs save time and material.

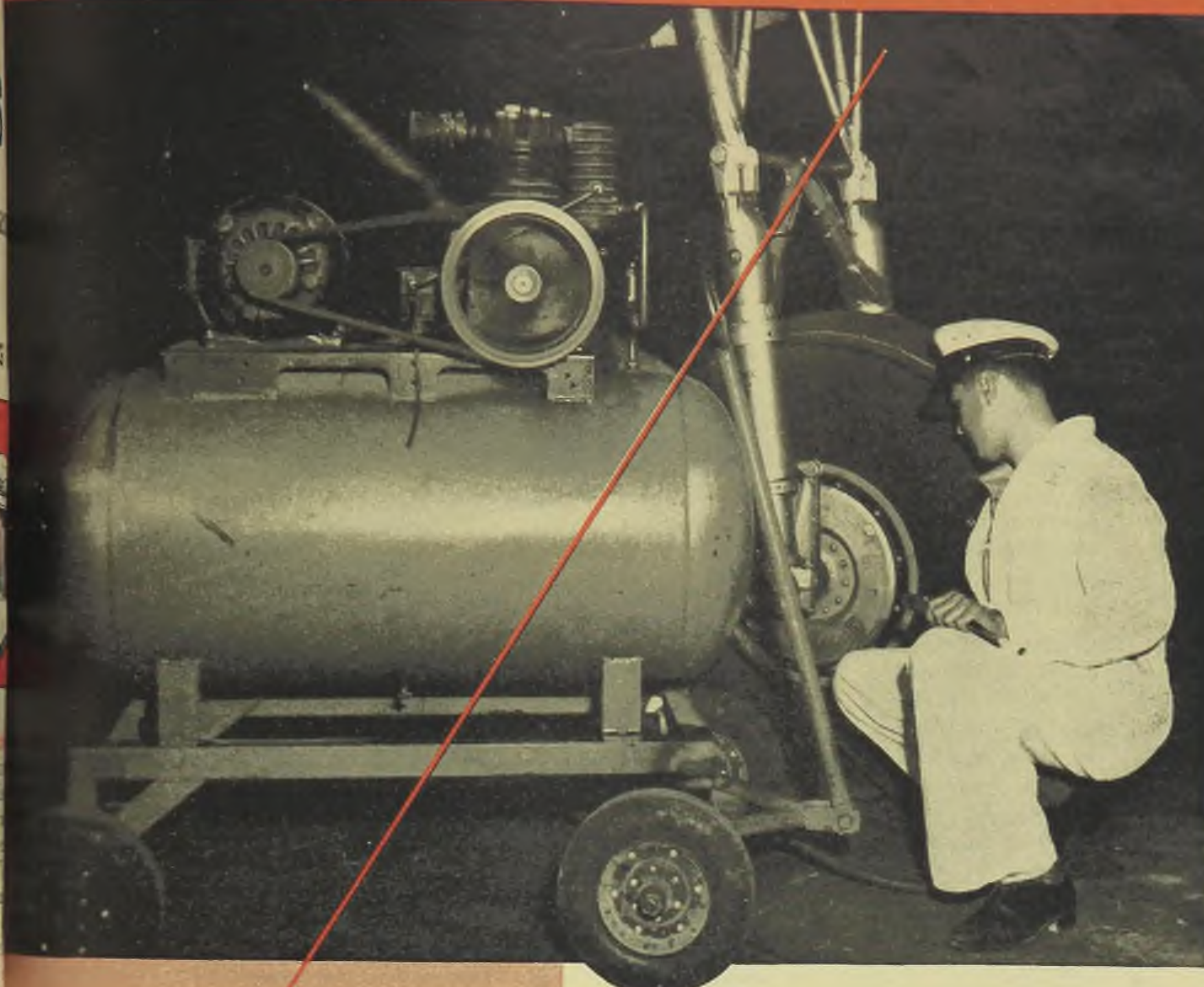
The Nelson Stud Welder is completely portable and light in weight. Proven by five years of actual use and used by more than 460 industrial plants it can be employed wherever there is need to end-weld studs to metal. Excellent for repair and maintenance work of all kinds. ***Write to the address below for complete details and catalog.***

NELSON SPECIALTY
WELDING EQUIPMENT CORPORATION
Dept. T, 440 Peralta Avenue, San Leandro, Calif.

Eastern Representative: Camden Stud Welding Corp.
Dept. 122, 1416 So. Sixth St., Camden N. J.

Cutaway view shows complete fusion of weld between stud and plate. *The weld is stronger than the strength of the stud.*

Scaife Air Tanks



help service America's Clipper Ships at home and abroad

Among many time-saving devices used by Pan-American Airways is the mobile compressed air outfit illustrated above—equipped with a Scaife air-receiver.

If your present or future plans call for the use of cylindrical products or containers for gases, air, water and other liquids, we will be glad to show you how our experience with products of this type may be of real help to you.

SCAIFE COMPANY

FOUNDED 1802

OAKMONT (Pittsburgh District), PA.

Representatives in Principal Cities

Back of our Trademark

Some of the Products of National Tool

HOBS,
GROUND AND UNGROUND

★

REAMERS

★

COUNTERBORES

★

GEAR CUTTERS

★

MILLING CUTTERS

★

HERRINGBONE CUTTERS

★

GEAR SHAPER CUTTERS

★

SLITTING SAWS

★

SPECIAL TOOLS

★

BROACHES

★

CIRCULAR AND FLAT
FORM TOOLS

National Tools are the shapers of progress.

NATIONAL TOOLS CLEVELAND

Skill and Experience of master planners, engineers and workmen.

Finest Materials to ensure durable and dependable metal cutting tools.

Super-sensitive Machinery that has made National Tool Products famous for their

. . . Precision

Some of the Users of National Tool

Studebaker
Delco-Remy
Curtiss Wright
General Electric
Wright Aeronautical
Cincinnati Milling Machine
Thompson Products, Inc.
Jack & Heintz, Inc.
Warner & Swasey
General Motors
Nash-Kelvinator
International Harvester
Chicago Gear Works
Frigidaire
Delco Products
Ford Motor
Buick Motor
Packard Motor
Continental Motors
Chevrolet
Cadillac Motor
Chrysler
Pontiac Motor
Hudson Motor
Heald Machine Company
American Locomotive
Caterpillar Tractor
R. G. LeTourneau, Inc.
Oliver Farm Equipment
Deere & Company
Ottumwa Iron Works
Youngstown Sheet & Tube
Sperry Gyroscope
Western Gear Works
Consolidated Vultee
S.K.F. Industries
Link Belt
Warner Gear
Spicer Manufacturing
D. O. James
Gleason Works
Detroit Gear Aircraft
Lufkin Foundry & Machine
Emsco Derrick & Equipment
Philadelphia Gear Works

Many other companies, large and small.

NATIONAL TOOLS HAVE AN INTERNATIONAL REPUTATION

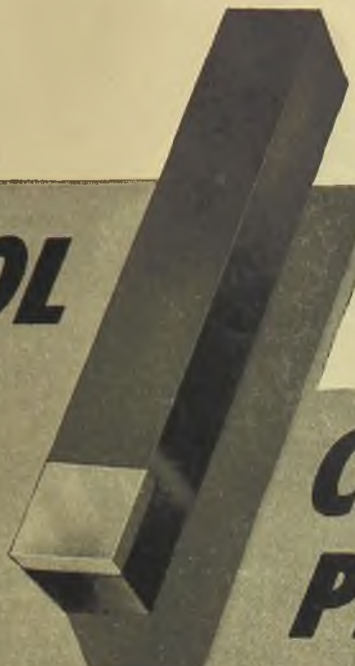
ARMY E NAVY

NATIONAL TOOL Co.

11200 MADISON AVENUE CLEVELAND, OHIO

UNFAILING PROCESS CONTROL FROM PURE-ORE
FIRST MELT BASIC MATERIAL TO FINISHED PRODUCT
"PURE ORE"
REG. U.S. PAT. OFF.
FINE TOOL STEELS
"PURE-ORE" Tool Steels are MAGNAFLUX Inspected in Our Warehouse
KLOSTER STEEL CORPORATION
SOLE PRODUCERS OF "PURE-ORE" FINE TOOL STEELS
OFFICE AND WAREHOUSE 224-228 NORTH JUSTINE STREET, CHICAGO 7, ILL.
KLOSTER PURE-ORE STEELS FOR EVERY TOOL & DIE PURPOSE
"Steel to Endure Must be Pure"

NO TOOL CONVERSION PROBLEM



With VASCOLOY-RAMET
TANTALUM-TUNGSTEN
STANDARD CARBIDE TOOLS

LIKE MONEY IN THE BANK

List your Vascoloy-Ramet Standard (Tantalum-Tungsten) Carbide Tools among your prime assets. These Tools have established many war-time production records and will continue to serve as efficiently in peace-time production.

Vascoloy-Ramet Standard Carbide Tools will perform the majority of carbide tool operations. Use them for maximum speeds, for heavier cuts, heavier feeds. Get increased production, most profitable results.

Keep a good assortment on hand; be ready to swing into peace-time production with the "World's Finest Carbide Tools." Check your stocks now!

WORLD'S FINEST CARBIDE

Ramet

VASCOLOY RAMET CORPORATION

4468

NORTH CHICAGO · ILLINOIS · SALES AND SERVICE IN PRINCIPAL CITIES

THERE'S A CLUE FOR YOU BEHIND THE RECORD-BREAKING PERFORMANCE OF "OLD 49"

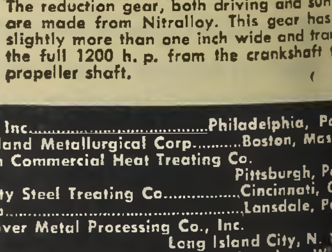
Breaking all records for sustained performance, four Wright Cyclone engines in the Boeing B-17 Flying Fortress "Old 49" have flown 1,134 hours and 15 minutes without overhaul. This accomplishment is equivalent to flying approximately 200,000 miles, *eight times around the world* at the equator, or more than 47 full days of time in the air. And it stamps "proof of performance" on the men who designed and built and maintained these engines, *and on the materials used.*

Nitrided Nitralloy one of the hardest steel surfaces known, was used at various places in these engines. The cylinder barrels, reduction gear—both driving and sun gear, and many other parts of the engine were made from Nitralloy.

Where surfaces must be extremely hard to resist spalling, and core strength is of vital importance, it will pay you to specify and use Nitrided Nitralloy. Nitriding is the process of case hardening certain alloy steels by means of a nitrogenous medium, such as ammonia gas. The alloy steels that are most suitable for Nitriding are known as Nitralloy.

Nitralloy Steels are available under government regulation where they will aid the war effort. Write for details.

Cylinder barrel is protected against wea[r] Nitralloy.



The reduction gear, both driving and sun [gear] are made from Nitralloy. This gear has slightly more than one inch wide and trans[mits] the full 1200 h. p. from the crankshaft to propeller shaft.

THE NITRALLOY CORPORATION
230 PARK AVENUE
NEW YORK 17, N. Y.

Companies Licensed by The Nitralloy Corporation

Allegheny Ludlum Steel Corp. .... Watervliet, N. Y.
Bethlehem Steel Co. .... Bethlehem, Pa.
Copperweld Steel Co. .... Warren, O.
Crucible Steel Co. of America .... New York, N. Y.
Firth-Sterling Steel Co. .... McKeesport, Pa.
Republic Steel Corporation .... Cleveland, O.
The Timken Roller Bearing Co. .... Canton, O.
Rotary Electric Steel Co. .... Detroit, Mich.
Vanadium-Alloys Steel Co. .... Pittsburgh, Pa.
Atlas Steel Limited .... Welland, Ontario

Operating & Accredited Nitriding Agents

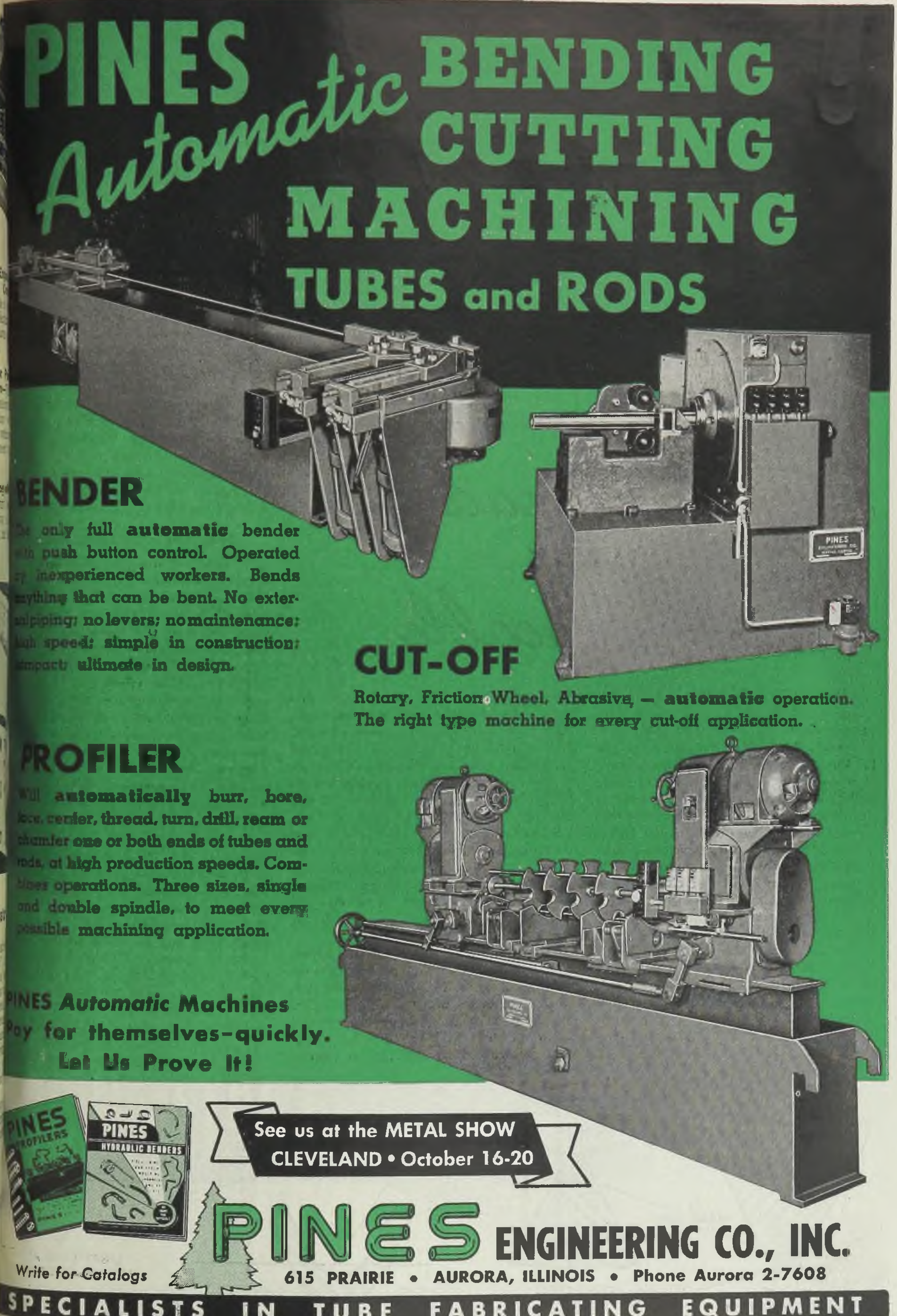
Commercial Steel Treating Corp. .... Detroit, Mich.
Englehard & Kenny .... North Arlington, N. J.
The Lakeside Steel Improvement Co. .... Cleveland, O.
Lindberg Steel Treating Co. .... Chicago, Ill.
Link-Belt Co. .... Philadelphia, Pa.
Met-Lab, Inc. .... Philadelphia, Pa.
New England Metallurgical Corp. .... Boston, Mass.
Pittsburgh Commercial Heat Treating Co. .... Pittsburgh, Pa.
Queen City Steel Treating Co. .... Cincinnati, O.
Rex & Erb .... Lansdale, Pa.
The Salkover Metal Processing Co., Inc. .... Long Island City, N. Y.
Wesley Steel Treating Co. .... Milwaukee, Wis.
N. A. Woodworth Co. .... Ferndale, Mich.
Ontario Research Foundation .... Toronto, Ontario, Can.

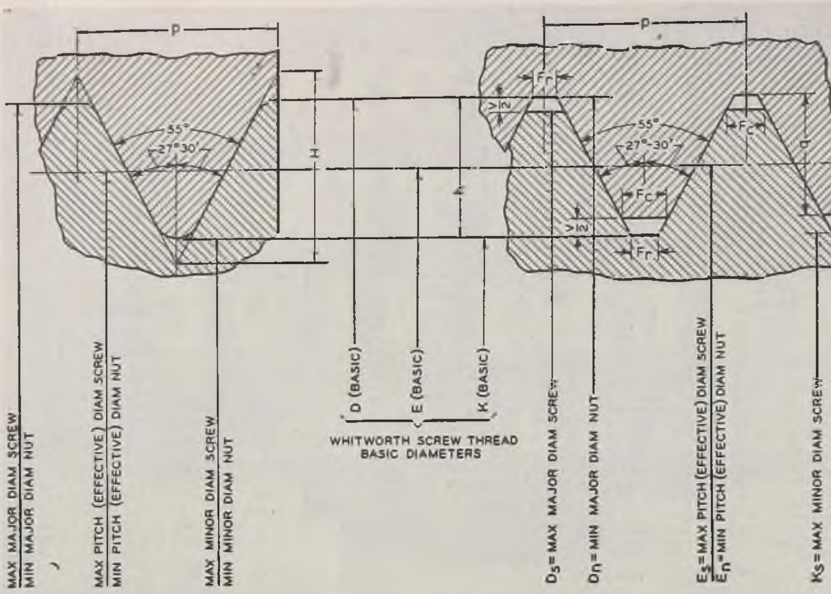
Manufacturers of Nitralloy Steel Castings

Milwaukee Steel Foundry Div., Grede Foundries, Inc. .... Milwaukee, Wis.

Warehouse & Stock

A. Milne & Co. .... New York, N. Y.


PINES
Automatic BENDING
CUTTING
MACHINING
TUBES and RODS
BENDER
The only full automatic bender with push button control. Operated by inexperienced workers. Bends anything that can be bent. No external piping; no levers; no maintenance; high speed; simple in construction; compact; ultimate in design.
CUT-OFF
Rotary, Friction Wheel, Abrasive, — automatic operation. The right type machine for every cut-off application.
PROFILER
Will automatically burr, bore, face, center, thread, turn, drill, ream or chamfer one or both ends of tubes and rods, at high production speeds. Combines operations. Three sizes, single and double spindle, to meet every possible machining application.
PINES Automatic Machines
Pay for themselves—quickly.
Let Us Prove It!
PINES PROFILERS
PINES HYDRAULIC BENDERS
See us at the METAL SHOW
CLEVELAND • October 16-20
PINES ENGINEERING CO., INC.
Write for Catalogs
615 PRAIRIE • AURORA, ILLINOIS • Phone Aurora 2-7608
SPECIALISTS IN TUBE FABRICATING EQUIPMENT



American Truncated Type and Full-Form British Whitworth

Screw Threads MADE Interchangeable

AMERICAN War Standard, Screw Threads of Truncated Whitworth Form (American Truncated Whitworth Threads), B1.6-1944, has been approved by the American Standards Association. It was developed by an ASA War Committee, organized in 1943 by request of the War Production Board. Truncated threads produced according to this standard are fully interchangeable with full-form threads produced according to the British Standard, Screw Threads of Whitworth Form, B.S 84-1940, which covers coarse and fine threads, straight pipe threads, and special threads.

The full-form British Standard Whitworth Thread and the American Truncated Whitworth Thread are illustrated side by side at top of page. Note that while the truncated threads at right are shown with sharp-cornered roots, the American War Standard permits the purchaser of threaded components to specify that threads be produced with rounded roots, even when new threading tools are used. This requirement must be explicitly stated in specifications for threads. Otherwise, it must be assumed that threads are to be produced by means of tools having flat crests when new. Flat crests and optional round crests of a new chaser and a new tap are shown at lower left, together with approximatae shapes of tool crests at their permissible wear limits. Shapes of the shallowest roots of screw and nut produced with such worn tools are shown at lower right.

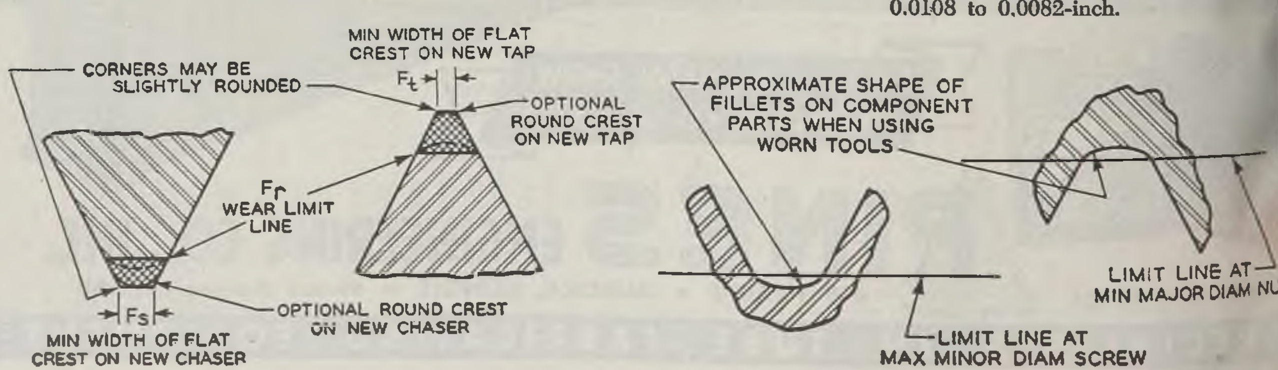
Original designs of a system of American Truncated Whitworth Threads were made by Archibald E. Smith, senior ordnance engineer, Army Ordnance Department. In 1941 the Ordnance Department was developing a British gun for American manufacture involving a special Whitworth thread and it appeared th[...] it would take a long time to proc[...] threading tools and gages required f[...] producing and checking the full-fo[...] Whitworth profile. Mr. Smith worked o[...] a system of truncated Whitworth threa[...] including gaging specifications, whi[...] could be produced with flat-crest[...] threading tools, the kind of tool co[...]monly used in this country for produci[...] American Standard threads. This syst[...] appeared to be entirely satisfactory [...] practice and had the great advanta[...] that tools and gages required for [...] truncated Whitworth threads were s[...]plied in about two weeks, while deliv[...] of tools for producing full-form Wh[...]worth threads would have taken at le[...] three months. The same problem arose [...] regard to many other lend-lease ite[...] manufactured in this country.

British Standard B.S. 84-1940 ma[...] provision for truncated major diamet[...] of external threads with close or medi[...] tolerance, but merely specifies a *minim*[...] limit for truncation. Maximum limit [...] crest may lie anywhere between ba[...] major diameter and minimum limit, [...] the maximum limit is left to the ma[...]facturer of threaded components.

Same Minimum Limit Adopted

In British-American conferences it [...] agreed that since the British minim[...] limit of truncation specified for a gi[...] kind of British Whitworth thread is [...]cated between the maximum limit a[...] the minimum limit proposed for the c[...]responding American truncated Wh[...]worth thread, an effort should be ma[...] to have the Americans and the Brit[...] agree on the adoption of the same mi[...]mum limit. To meet on the same lev[...] the Americans would have to raise [...] minimum limit of the truncation specifi[...] in their 1943 proposal, and the Briti[...] would have to lower the minimum lin[...] given in B.S. 84-1940.

For example, according to the Briti[...] Standard, B.S. 84-1940, the minimu[...] limit to which the crest of an extern[...] fine thread, nominal size 1 inch (10 threa[...]per inch), may be truncated is 0.981[...] inch. The maximum and minimu[...] limits proposed in 1943 for the corr[...]sponding American truncated Whitwor[...] thread were 0.9852 and 0.9744-inch. [...] the American War Standard now ap[...]proved, minimum limit for this kind [...] thread has been increased to 0.9770-inc[...] Accordingly, tolerance on the major diam[...]eter of the screw has been reduced fro[...] 0.0108 to 0.0082-inch.



Trimetric Projection

Converts conventional drawings to 3-dimensional type by simplified method

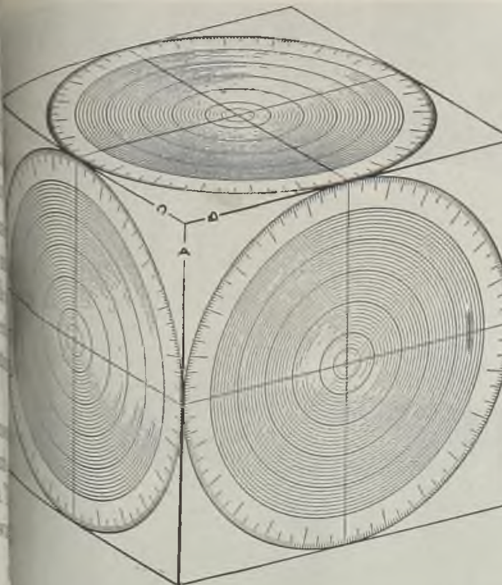


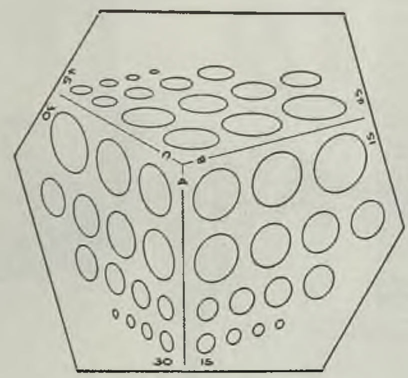
Fig. 1. *Underlay used to trace off ellipses on trimetric drawings*

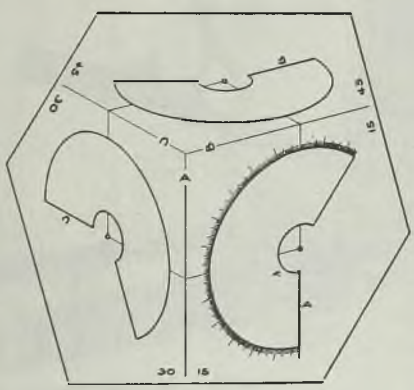
THE required to produce trimetric drawings is reduced 50 to 80 per cent by the Axonograph, which photographically translates a conventional orthographic drawing into a scale representation of one face or dimension of a trimetric projection. The other two dimensions or faces are filled in by a draftsman to give a scale trimetric drawing in from one-fifth to one-half the time normally needed. By adjusting the machine and print position on the copy board according to a predetermined scale it is possible to produce the required print in any one of three trimetric planes, plan, face, or side, to fit the needs of each particular job. It is possible to vary the scale as required while maintaining accuracy within four decimal places.

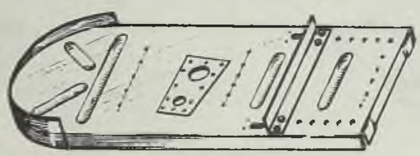
Advantageous in Assembly Work

Four new drawing instruments, designed by W. G. Wilkinson and H. C. Bartholomew of Glenn L. Martin Co., Baltimore, also were developed as aids to three-dimensional drawing often considered the ideal form of production illustration. They are a trimetric scale with its three faces calibrated to correspond with the three axes of the trimetric drawing, an ellipse template (Fig. 2), an ellipse underlay (Fig. 1), and a trimetric protractor (Fig. 3). The first replaces the regular draftsman's scale used in conventional drawing. The ellipse template and ellipse underlay together take over the duties of the compass, while the trimetric protractor corresponds to the normal protractor used in determining angles. These special instruments are used in conjunction with the regular triangles and E-square of conventional engineering drawing.

The principal advantage of the trimetric projection or drawing is in assembly work, where its presentation of three dimensions with a minimum of distortion offers a far clearer picture of how various parts and subassemblies go together than can be given by an orthographic projection or by other types of three dimensional drawings such as perspective, oblique and isometric projections. The trimetric drawing does not replace the orthographic projection in manufacturing operations, but is a supplementary drawing which speeds and simplifies assembly work, and is usually prepared after orthographic projections of the various detail parts. Thus, the latter are always available for making Asonometric prints.







(Top to bottom)—

Fig. 2. Template used for drawing ellipses

Fig. 3. Trimetric protractor used for measuring angles

Fig. 4. Finished trimetric drawing of A-30 bulkhead traced from Axonometric print

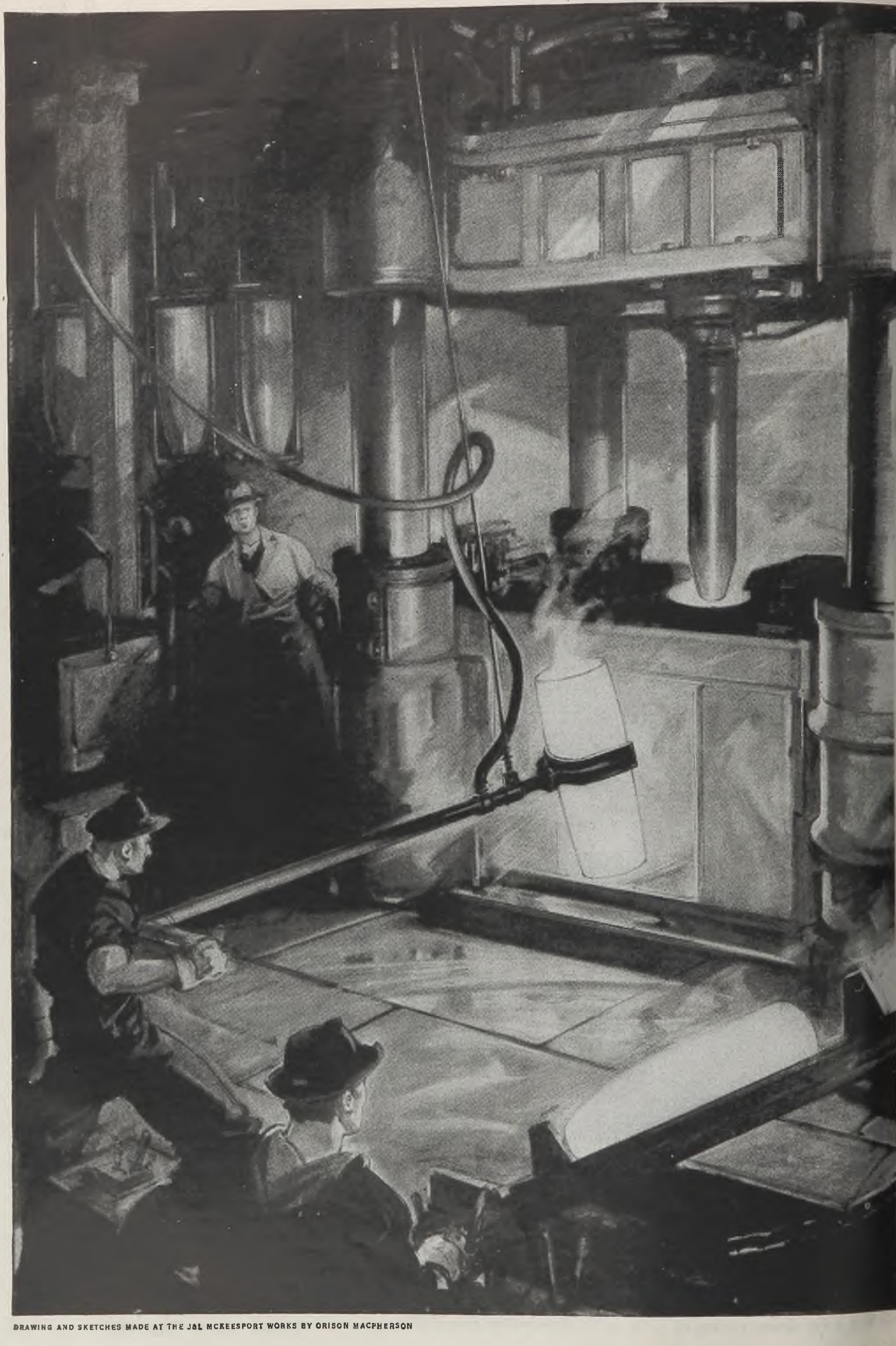
Semiskilled Operators Make Prints

Procedure for preparing a trimetric drawing by means of the Axonograph can best be illustrated by following through on a typical example such as an airplane fuselage. The scale desired on the finished drawing is determined, and the drawing is broken down into its various component parts, such as the bulkheads. The negatives from which lofting templates of these various parts were made are then sent to the Axonograph with instructions as to scale and the principal plane in which each part will appear on the finished trimetric. The former depends on the scale of the finished drawing and the scales of drawings from which Axonograph prints are to be made. If all prints are to the same scale, only one Axonograph setting is required, but if they are to different scales, the machine can be adjusted to compensate for this and produce prints which are all to one scale.

The plane in which the print is to be made is determined by nature of the part and its position in relation to the position of the finished drawing. Thus, in the case of a fuselage, if the finished trimetric projection is to show it in a position corresponding to a three-quarter rear view, Axonometric prints of the bulkheads would be made in the face planes, prints of a top hatch in the plan plane, while those of a side hatch would be made in the side plane.

Making the Axonograph prints is a

(Please turn to Page 340)



DRAWING AND SKETCHES MADE AT THE J&L MCKEESPORT WORKS BY ORISON MACPHERSON

Machining an 8-inch shell

Inspecting 105 mm shells

Pressing rotating bands on shell

BIG SHELLS SAVE LIVES

"Black Panther," invasion pin-up gun, is an Army Ordnance 8-inch 23-ton mobile weapon that fires 256 pounds of steel and high explosive a distance of 20 miles so accurately it will drop its big shells "right on the courthouse steps." This gun out-ranges Germans' best gun by 2 miles, fires shell 100 lbs. heavier. Half the total production of steel shells is being made in Pittsburgh Ordnance District for the "Black Panther" and the 14-ton, 8-in. howitzer on wheels, maximum range 10 miles.

Cannon derives from "kanna," Greek for tube, literally a hollow reed, like bamboo.

Drenching the enemy with big shells to save American lives was theme of a demonstration-conference Army Ordnance Chiefs recently held with other shell manufacturers at McKeesport (Pa.) Works of Jones & Laughlin Steel Corporation. Led by Maj. Gen. Levin H. Campbell, Chief of Ordnance, and Brig. Gen. R. E. Hardy, Chief, Ammunition Branch, the party inspected plant where bomb line was converted to artillery 8-in. shell line (see illustration) in record time.

Propaganda shot to enemy in howitzer shells is working to break Axis morale, the army reports. 105mm shells, (over 3 million produced in J&L McKeesport Works), are timed to burst over enemy territory, scattering printed leaflets telling truth about war. They are well received, prisoners report.

Gun barrel got its name from 14th century Flemish weapons made of iron strips fashioned into long tubes and bound by hoops, like wine casks or barrels.

First gun using powder was built in Flanders about 1314. Called "fire pot," it was shaped like a vase, shot heavy, 4-sided, iron-headed arrows, was fired by wary gunner with lighted taper, who touched priming powder—and ran.

Gunpowder not Chinese invention, in opinion of many historians. Some give credit now to Roger Bacon, English author and alchemist (1214-1292).

First shell forgings for this war made on an upsetter were produced by J&L Aliquippa Works in 1940 for British 6-inch shell. Using peace-time machinery without conversion, these forgings effected a substantial saving of steel. Aliquippa and Pittsburgh Works of J&L, as well as McKeesport Works, are furnishing great quantities of bomb casings, shell blanks and fragmentation bombs.

"He shall flee from the iron weapon and the bow of steel shall strike him through" (Job, 20, Oxford Bible) is one of few references in Scriptures to these metals applied to weapons of war. This prediction of startling timeliness foretells that: "The triumphing of the wicked is short. Though his height mount up to the heavens and his head reach into the clouds, yet he shall perish forever. And the earth shall rise up against him."

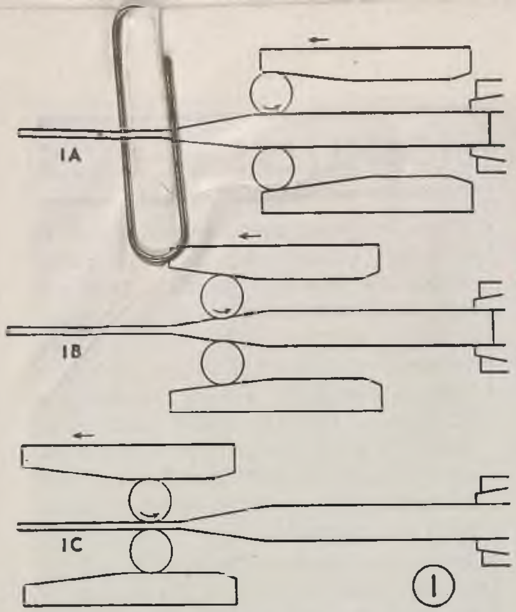


Fig. 1—Schematic representation of action of Krause mill

Krause Mil

Embodies New Principle of Rolling

TWO commercial installations of the Krause cold-reducing mill, the first to be installed, indicate possibilities for extensive application of this entirely new method of rolling to a wide range of both hot and cold rolling operations. While these initial installations are being used for rolling copper and brass, working tests of the mills indicate they also can be employed for rolling steel.

The process now is being used for reducing ½-inch thick material up to 26 inches wide down to 0.030-inch gage, in a single pass. In conventional mill practice, such reduction usually requires four to six passes with at least three anneals for brass. The same equipment can be used to roll to much lighter gages, as low as 0.005 to 0.010-inch, as well as to reduce 1-inch thick slabs to 0.050-inch. Hot reduction of slabs up to 4 or 5 inches also may be undertaken with suitably designed equipment. Rolling of tapered material, such as spring leaves, and some types of shapes also appears feasible on this type mill. An interesting possibility is the formation of tapered skin covering for wings of aircraft.

Employs New Method

The mills, developed by engineers of the Lewis Foundry & Machine Division of Blaw-Knox Co., Pittsburgh, under the direction of Frank R. Krause, the inventor, employ a distinctly new principle of rolling. Instead of the material passing through power-driven rolls, it is held in tension by a gripper and the rolls are moved by frictional contact between cam plates and the metal between the rolls approximating "Turk's head" rolling. The rolls are not driven by the direct application of power through spindles. Their motion and pressure are produced by the action of reciprocating cam plates. These cam plates and the necessary frame to hold them in position apply pressure on the work stroke in the direction of the finished end of the material. No pressure is applied on the return stroke. The reduction is done largely by the tension in the strip in contradistinction to other roller-forging methods which work the stock under high compression.

Fig. 1 is a schematic representation of the action of a Krause mill with the drive and structural details omitted for clarity. Angles of the cam plates and thickness of the rolled material have been exaggerated. The material, which can be handled in lengths up to 25 feet, is held in the gripper at the right. This gripper keeps the material under tension during the working stroke of the mill. It is moved by a screw which permits it to feed material at the desired speed.

How Mill Operates

At the beginning of the working stroke (see Fig. 1A), the rolls are in a position slightly behind the previously rolled material. They are backed up by the cam plates which in turn are held in the mill housing. Since the cam plates are rigidly held in the mill housing, the rolls are rotated as the housing moves in the direction of the arrow and pressure is applied as the thicker portions of the cam plates contact the rolls.

As will be noted in Fig. 1B, the rolls and cam plates partially through the working stroke and indicates the action of the rolls on the metal.

After completing the desired reduction, portions of the cam plates, which are parallel to the material, pass over the rolls and the rolls make a finishing pass over a portion of the previously rolled material (illustrated in Fig. 1C). Near the end of the stroke, the cam plates have a slight reverse angle to release the pressure of the rolls.

At the end of the working stroke, cam-operated mechanism withdraws wedge from the lower cam plate. Thi drops the lower roll sufficiently to pe mit the rolls to be returned to the original position in preparation for th next working stroke.

The screw, which moves the grippe in the meantime has fed the material fo ward so that an unrolled portion of th bar is in position for rolling. The rolle material as it comes from the delive end is coiled.

Produces Nonferrous Material

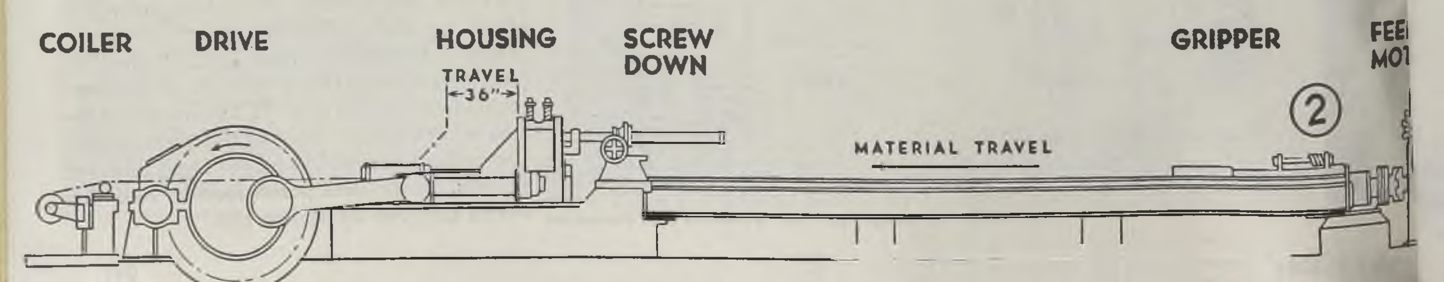
Two 28-inch mills were installed f commercial production early this yea at C. G. Hussey Co., Pittsburgh, and th Michigan Division of Revere Copper Brass Co., Detroit. These mills a similar in main features but have diffe ent motors and auxiliary equipment conform with available plants faciliti and owner requirements. Constructi of these mills followed 10 years of r search work by Mr. Krause and extensi experimental operations with a 10-in mill erected at Lewis Foundry & M chine, Groveton, Pa.

The mill installed for C. G. Hussey Co. reveals essential features of the pro ess common to both. Fig. 2 shows general layout of the mill and Fig. the major details of the mill stand.

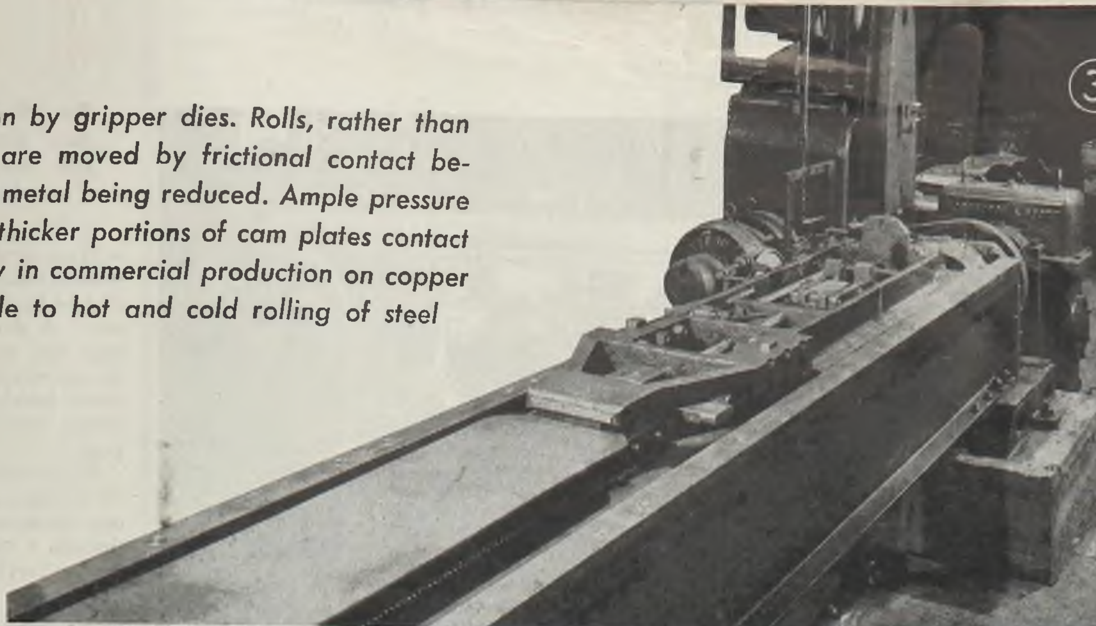
Rolls are 4 inches diameter and 2 inches long, of high-carbon, high-chrom ium steel forgings. Since no pressure placed on the roll necks other than th necessary to keep them in position, pla bronze bearings are provided. The ca plates are heat treated alloy steel forg ings.

The mills provide a solution to the rol ing problem of being able to exert gre pressure with rolls of small diamete The use of backup rolls provided o solution of this in wide strip mills b the rolls in 4-high mills still suffered fro the limitation that they are supported b bearings at the roll necks and some di tortion is inevitable when great rollin pressures are required.

In the Krause mill there is no pressur on the bearings at the roll necks. Th



Work is held in tension by gripper dies. Rolls, rather than being driven axially, are moved by frictional contact between cam plates and metal being reduced. Ample pressure is applied to piece as thicker portions of cam plates contact the rolls. New mill now in commercial production on copper and brass is applicable to hot and cold rolling of steel



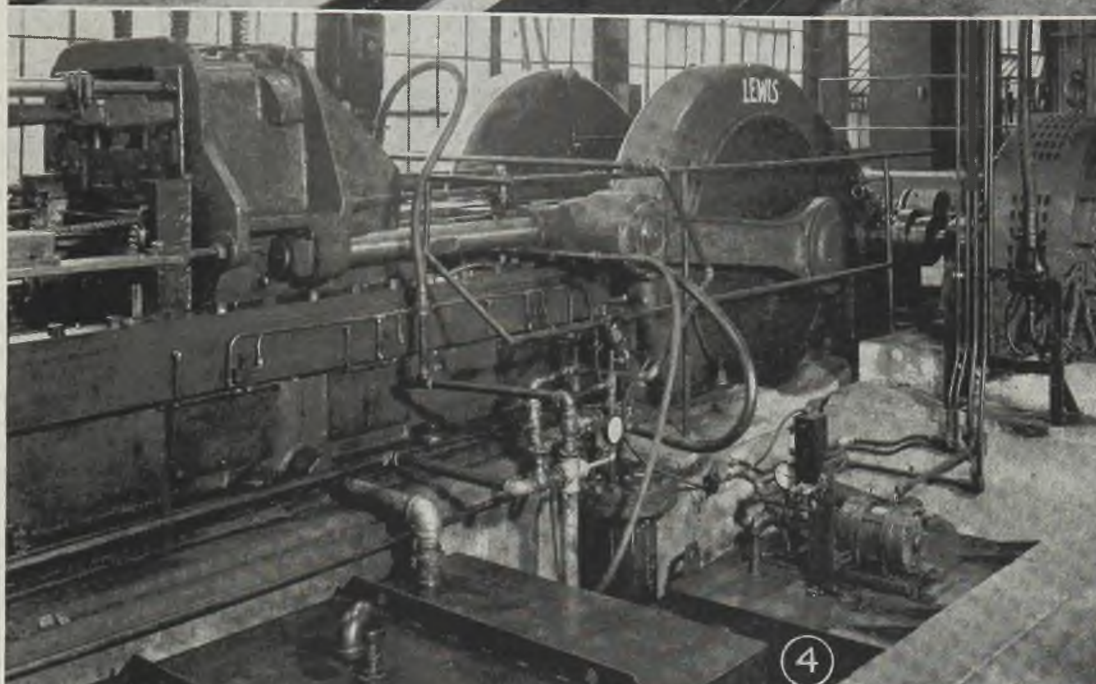
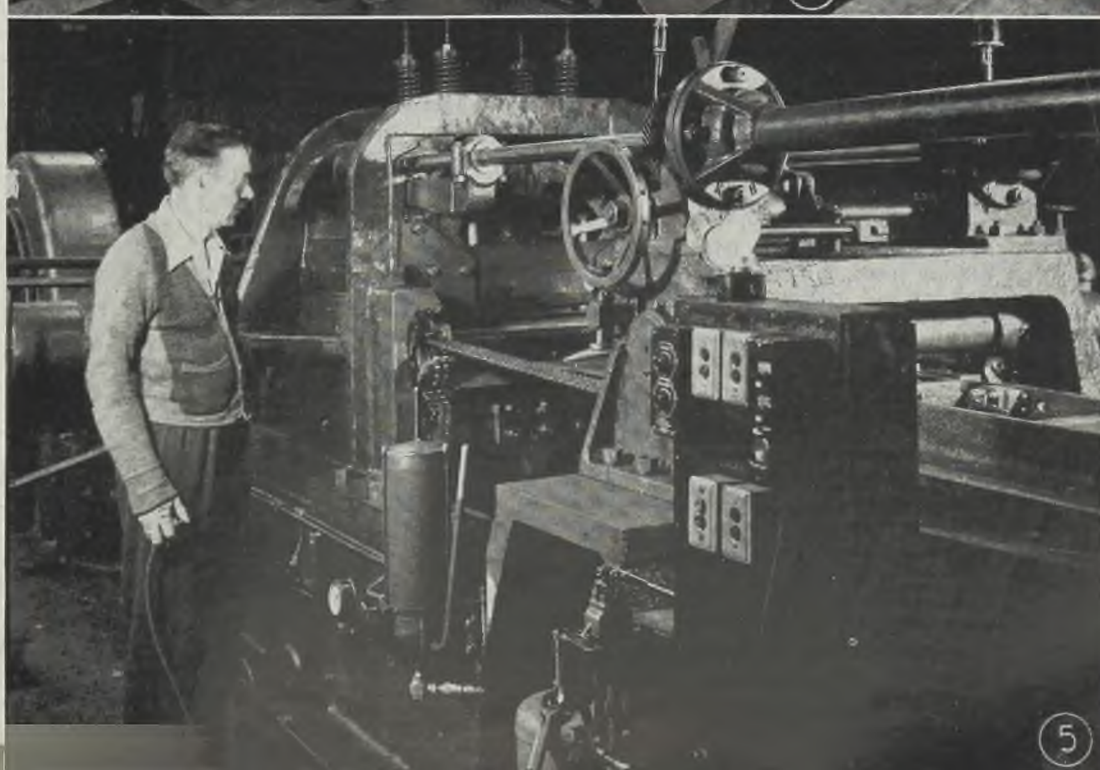


Fig. 2—General layout of mill at plant of C. G. Hussey & Co., Pittsburgh

Fig. 3—Drive and gripper dies for feeding and maintaining tension of bars during working stroke of mill

Fig. 4—General view of mill stand and drive. Tanks for coolant and lubricant are in pit in foreground

Fig. 5—Control side of mill. Remote control button may be used to stop mill even though operator is not at control panel



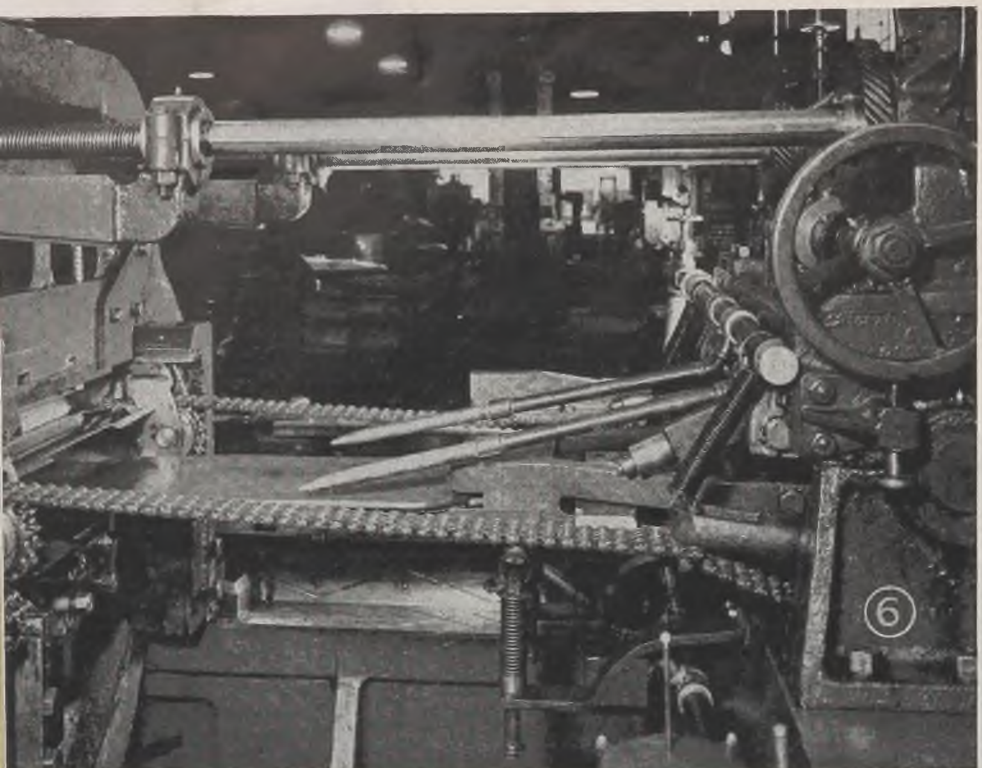


Fig. 6—Receiving side of mi… stand showing gripper shortly be… fore reaching full extent of i… travel, and screwdown at right

entire pressure is distributed evenly along the faces of the rolls by the cam plates which, with the backing up structure of the housing, can be made as massive as is necessary to exert the desired pressure without distortion.

The housing for the rolls and cam plates is massive in construction. It, with its attendant reciprocating parts, weighs 10 tons. Two manually operated screwdowns, which move the wedges, are provided for setting the desired gage to be rolled. A clutch permits independent operation of the screws. The gage may be changed while rolling and, if desired, a single bar may be finished out in several thicknesses for jobbing work.

A system of wedges between the cam plates and the plates on the mill housing provides for adjustments. Four wedges with indicators on the screws graduated at 0.001-inch permit deflection of the cam plate to give the effect of a crowned roll. In actual operation, it has been found that few adjustments are necessary. Because of the relatively slow delivery speed, the rigidity of the housing, and the ability to change screw settings quickly, gage control can be kept exact both from side to side and from end to end.

The machinery for imparting the reciprocating movement to the housing consists of a motor directly connected to a crank drive, with connecting rods mounted on crank pins integral with the gears, and crossheads directly connected to the mill housing. The length of stroke may be either 36 or 32 inches. Anti-friction bearings are used on the mill drive and connecting rods.

An 800-gallon tank is provided for the supply of coolant which is sprayed on the rolls at the rate of 30 gallons per minute. A 400-gallon tank is provided for lubrication of the drive. A Blaw-Knox lubrication system is installed on the mill ways.

The mill is driven by a 500-horsepower alternating-current motor which moves the mill housing at 62 strokes per minute.

In designing the drives, provision was made for the possibility of handling much thicker material in the future and the motive power was made considerably greater than was immediately needed. In actual production, the peak load has been found to be 150 to 175 horsepower for 16-inch width material which is equivalent to about 10 horsepower to each inch of width.

The gripper jaws, which feed the bars and keep them under tension during the working stroke of the mill, are oper… pneumatically and moved by a s… 36 feet long with 6 inches outside d… eter. A slack adjustment nut 6 in… long also is provided. The screw… do not extend around the bottom o… screw which permits steady rests… placed under the screw to prevent… ging.

When feeding, the screw is driven… 7½-horsepower 1160-revolution per… ute alternating-current motor, oper… through a reducing gear. The feed… is slow, varying between 15 and 30 i… per minute, the exact rate of feed… pends upon the gage. Provision is… for rapid traverse of the gripper wh… is being returned to its original po… This rapid traverse drive consists… 5-horsepower 514-revolution per m… alternating-current motor driving… screw through a belt drive. Whe… rapid traverse return motor is used a… operated clutch disengages the shaft… the gear reducer of the regular feed… tor.

Rolled Material Is Coiled

After being rolled, the material g… a blocker or reel which has a 1… collapsing drum and can handle a… mum coil 20 inches diameter. The b… is driven by a 10-horsepower… revolution per minute motor throu… variable-speed drive which adjust… speed to the change of diameter… coil. Since the rolled material i… charged from the mill intermitten… slip clutch is provided in the coiler…

Strip rolled by the Krause m… shows a finer and more even grain… ture than is secured by conventional… ing practices. Olsen cup tests sho… variation from strip rolled by other… ods. In rolling copper, which h… tendency to crack along the edges,… times as much as 1½ inches in co… tional rolling, the maximum crack… material from the Krause mills have… ¼-inch with the average being cons… ably less.

The delivery speed of the mill inst…

(*Please turn to Page* 326)

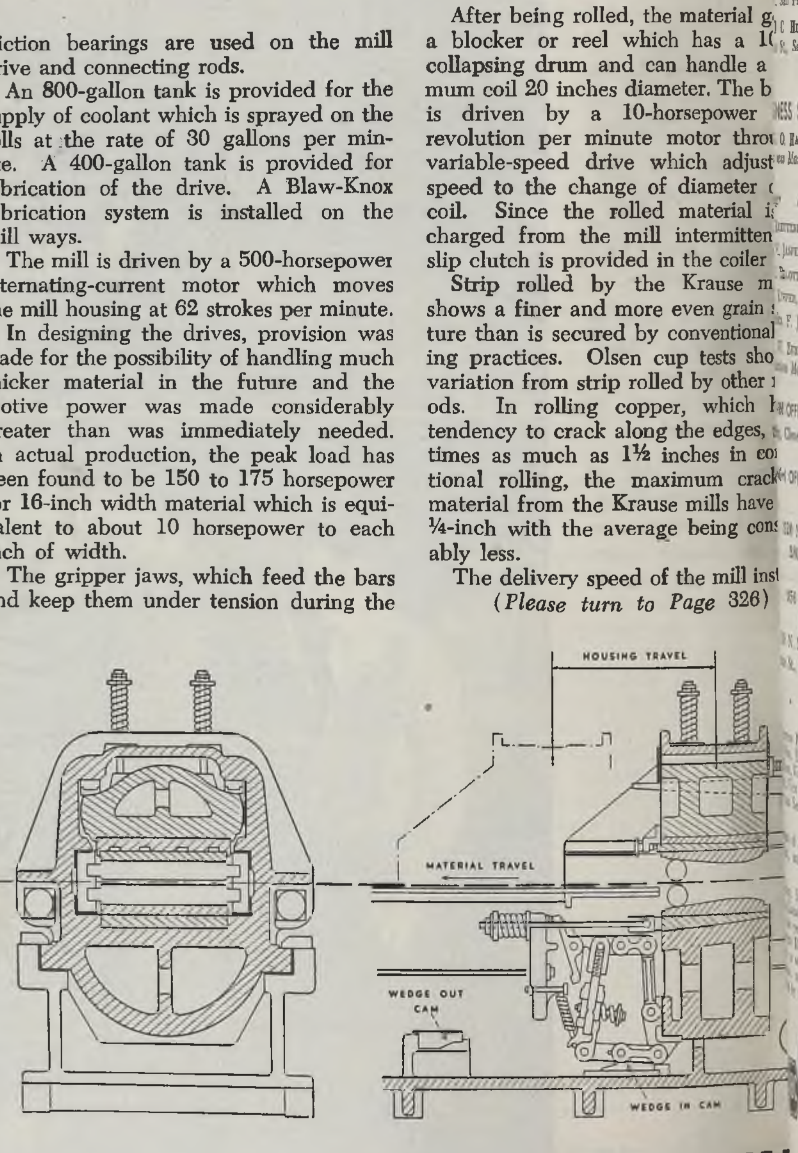


Fig. 7—Major details of mill stand with rolls 4 inches diameter and 28 inches long